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IDENTIFIERS	Project HIRE

ABSTRACT

Designed as supplemental material to on-going instruction in the vocational program, this teacher's manual to the Arc Welding series is intended to accompany three dictionary booklets (available as CE 024 411, CE 024 412, and CE 024 413) for use by handicapped students to help them master the core vocabulary taught in the trade. Information presented in the manual includes an introduction to the materials, student outcomes, teaching suggestions, an alphabetical index to the vocabulary taught in the series, and use of the materials. Answer keys are given for the activity sheets and check-up pages which accompany each of the fourteen lessons in this set. "Master" copies of the activity sheets and check-ups are also provided. Informative materials on Project HIRE, which developed these materials, occupational information, and an annotated bibliography of selected materials are appended. (This is one of five series of materials developed by project HIRE. The two-volume final report of the project is available as CE 024 117 and CE 024 118. See Note for the other series.) (YLB)

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Arc Welding Teacher's Manual

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CE 024 410

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TEACHER'S MANUAL

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TEACHER'S MANUAL

I. INTRODUCTION

In our modern technological society, the beginning worker must master the core vocabulary of the job in order to communicate effectively with fellow workers, employers and customers. Many learning handicapped students have problems learning the language of the trade and thus may experience difficulty or even failure on the job. The purpose of this series of modules is to assist the learning handicapped student to master this core vocabulary.

The materials in this series were developed by interdisciplinary teams of vocational teachers, special education teachers and university faculty. The materials have been field-tested and refined. They are designed to help students who have learning problems master the core vocabulary of a specific vocational area. The modules are not intended to teach the student how to perform a task. They are meant to familiarize and reinforce the basic vocabulary taught in the trade. The words contained in each set of modules have been validated by a sample of employers on the following bases:

1. The words should be in frequent or moderate usage.
2. The words must be essential for job success for the beginning worker.

The modules are designed so that students, using the tapes that accompany each set, can work with minimal supervision, alone or in small groups. Each module is constructed so that it can be used by a resource room teacher who may have limited knowledge about the vocational area.

These materials are to be used as supplements to the on-going instruction in the vocational program.

The materials for each set of modules are:

1. Teacher's Manual which includes:
    - a. Supplementary learning activities
    - b. Progress checks
2. Three Picture Dictionary booklets, with accompanying tapes
3. Flash Cards

II. QUESTIONS AND ANSWERS

1.	When should the materials be used?	1.	To provide supplemental instruction for special needs students who are having difficulty with technical terminology.
2.	Do the materials include all the technical vocabulary in the trade?	2.	No. Vocabulary words are primarily for entry-level jobs.
3.	Do the materials teach a student how to perform a specific task?	3.	No. The materials do not teach process. The purpose is to give students additional instruction and understanding of vocabulary.
4.	Can a special education teacher use this series without special training?	4.	Yes. The series has been designed for regular, special and resource room teachers.
5.	How do I begin?	5.	Familiarize yourself with the materials. Then pretest. Select the appropriate booklet. Assist student with Lesson 1. Most students can work alone with minimum assistance.
6.	What extra materials will I need?	6.	A cassette tape player. All other materials are provided in the packet.
7.	Can this series be used for group instruction?	7.	The materials will work best if used by students working individually or in small groups.
8.	Can I alter the recommended sequence?	8.	Yes, alteration of the sequence to individualize instruction is appropriate.

9. How about evaluation?	9. Activity sheets are included at the end of each lesson. Progress checks are also included for each lesson.

III. STUDENT OUTCOMES

This series is designed to maximize success and minimize failure. Students should not be penalized for requiring numerous trials in order to reach the established criterion of 100% correct on the activity checks. Some students will master the individual lessons in one or two trials. Others will require more trials to criterion. REMEMBER, these materials were designed to help every student reach mastery!

After completing the series, the student should be able to:

1. Match each word/illustration to the appropriate definition.
2. Match each illustration to its appropriate definition.
3. Match each illustration to the appropriate word.

IV. CORE VOCABULARY

The following pages contain an alphabetized list of the terms in this series.

V. TEACHING SUGGESTIONS

A. Explanation

The materials prepared for these units have been designed to take advantage of certain principles of learning that are well known to teachers. Among principles used in preparation for these materials are:

1. Learning is faster if materials are meaningful to students.
2. Learning is maintained best if learned material is used soon after it is learned.
3. For facts, learning is faster and better retained if practice is distributed during the learning time (rather than "crammed.")

ARC WELDING

Alphabetical Index

Vocabulary Word	Book	Page
abrasion	I	32
A.C.	II	63
air chipping hammer	II	82
alloyed steel	II	84
aluminum	II	90
amperage	I	30
angle	III	127
arc	I	25
arc length	III	118
arc welding machine	II	58
ballpein hammer	II	79
base metal	III	112
bead	III	123
bevel groove	III	95
butt joint	III	107
C-clamp	II	76
center punch	II	77
chisel	II	74
circumference	III	129
cleaning brush	II	75
coating	I	6
cold roll steel	II	85
combustible	I	1
concave weld	III	100
continuous weld	III	135
convex weld	III	101
corner joint	III	108
current	II	57
current control	II	59
D.C. reverse polarity	II	61
D.C. straight polarity	II	62
degree	III	133
diameter	III	130
disconnect	I	28
distance	III	128
duct	I	39
edge joint	III	111
E-holder	II	72
electric shock	I	26
E-stub	II	47
electrode	II	44
electrode cable	II	65
electrode cable connector	II	66
electrode code	II	48
face	III	113
fahranheit	I	31
field weld	III	103
filler metal	II	45
fillet weld	III	104
filter lens	I	12
fire extinguisher	I	34
flare bevel groove	III	99
flash	I	36
flash goggles	I	16
flat position	II	52
flush contour weld	II	102
flux coating	II	46
frayed	II	5
galvanized steel	II	87
glare	I	11
groove	III	91
groove weld	III	92
ground cable	II	67
ground cable connector	II	68
ground clamp	II	69
hair net	I	9
hand chipping hammer	II	73
heat resistant	I	4
helmet	I	13
high carbon steel	II	88
horizontal position	II	53
hot roll steel	II	86
housekeeping	I	35
infrared	I	42
insulation	I	27
jewelry	I	8
J-groove	III	97
lap joint	III	110
leather bib	I	19
leather gloves	I	22
leather jacket	I	18
leather leggings	I	21
leather sleeves	I	20
leg	III	117
loose connection	I	29
low carbon steel	II	89
melt through weld	III	122
moisture	I	40
molten metal	I	43
non-combustible	I	2
on-off switch	II	64
overhead position	II	54
pein	II	78
P.S.I.	II	50
polarity switch	II	60
position	II	51
power cable	II	70
power cleaning brush	II	81
protractor	III	135

ARC WELDING ALPHABETICAL INDEX

Vocabulary Word	Book	Page
radiation	I	17
radius	III	131
ray	I	41
root	III	114
root opening	III	120
root penetration	III	121
safety goggles	I	14
side shield	I	33
slag	I	24
sparks	I	7
spatter	I	7
square groove	III	93
straight edge	III	132
stringer bead	III	124
surface weld	III	106
synthetic	I	3
T-bevel	III	134
tack weld	III	119
tee joint	III	109
tensile strength	II	49
throat	III	115
toe	III	116
tongs	II	83
toxic fumes	I	37
U-groove	III	96
undercut	III	126
V-groove	III	94
ventilation	I	38
vertical position	II	55
weld all around	III	105
welder's cap	I	23
welding position	II	56
welding table	II	71

4. Correct practice on recently learned materials increases retention.
5. Clustering facts to be learned improves retention.
6. Sequencing of materials to be learned improves learning speed; easy material first and difficult material later.
7. Overlearning (review) helps retention.
8. Knowing a part of the task prior to attempting the entire task can aid students to learn.

B. Procedures for Use of Materials

Because the materials have been developed with the principles cited above, it is requested that teachers use them as designed. Changes such as using Module II before Module I are appropriate if such change provides better coordination with vocational instruction. Using a part of Module I and a part of Module II, and selecting parts of workbooks to go with selections would not be appropriate, even if the teacher believed the student already knew some of the vocabulary items in a particular module; it is important for the student to find some of the words "too easy" along with the "too hard" ones; this can keep the student at work on a task that might otherwise be abandoned as too difficult. Furthermore, practice on materials the student already knows can aid in ensuring retention.

C. Steps in Using Materials

1. Getting the Student Started
    a. Make sure the tabs at the top of the cassette tape are punched out to prevent accidental erasure.
    b. Take the students to a table in a quiet area with the tape recorder, the flashcards, and the picture dictionary book(s).

c. Be sure that the student knows: (1) how to insert the tape; (2) how to follow directions that are written in the dictionary and provided on the tape, and (3) how to use the small book. Show the student the box of flashcards so that they can be used when needed.

2. Explanations to Student

a. Keep them at a minimum. Simply say in your own words that these materials are designed to help students learn technical vocabulary.

b. Let the student know that you are aware that some words will be "too easy" and some "hard" but that you expect all to be done.

c. During the first session for each student, observe for a few minutes to ensure that the student does not fail because of misunderstanding of the simple procedures for using the materials.

3. Letting Student Study

Go about one or more of your other numerous tasks until the student comes to tell you the words are learned.

4. Activity Sheets

a. Make sure the student understands how to do the ACTIVITY. After the explanation, the student should complete the pages ALONE without any help from you or the other students.

b. Check the student's ACTIVITY sheets. If the score is 100% correct, go to 4c below. If the score is less than 100% correct, ask the student to use the tape and booklet again, doing the flashcards again also.

c. If the student was 100% correct on the ACTIVITY, give the CHECK UP sheets for the relevant lessons. Make sure student understands the directions. Again, students should work ALONE.

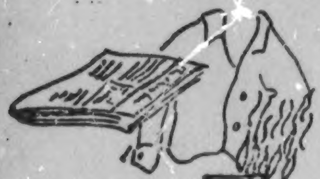
d. With the student watching, correct any errors on the CHECKUP SHEETS. Scores should be almost all correct if the ACTIVITY was 100% correct. If there is still trouble, the student probably needs to review the tape/booklet materials some more and then take the CHECKUP again.

ANSWER KEYS
TO
ACTIVITY PAGES

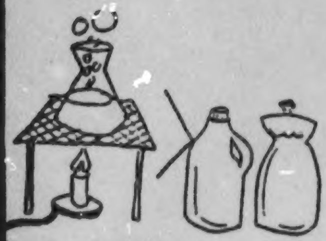
ARC WELDING I
Activity 1
Lesson 1

Name____________________ Date____________________

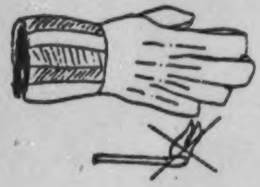
Match the picture and the meaning. Put the right number on the line beside the meaning.



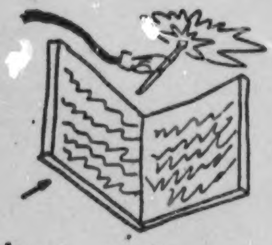
1. combustible



. synthetic



. non-combustible



. heat resistant

2 Things that are man-made.

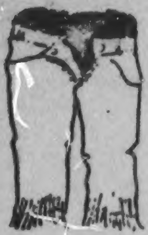
3 This means that clothes will not burn.

4 Clothes or other things that can take some heat without burning.

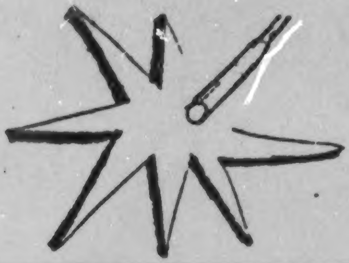
1 When clothes or other materials burn.

Activity 1 (page 2)

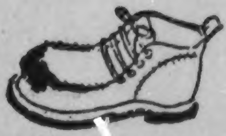
Name____________________ Date____________________



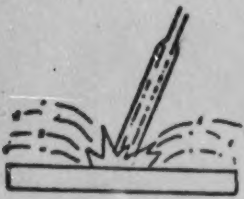
5. frayed



6. glare



. steel toe shoe



. sparks and spatter

6 A very bright light.

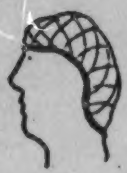
5 Threads at the edge of cloth that are loose.

8 Small burning pieces of metal.

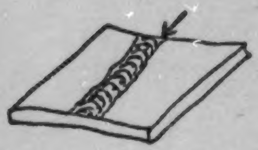
7 A shoe that protects your foot from heavy falling objects.

Activity 1 (page 3)

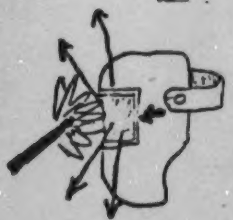
Name____________________ Date____________________



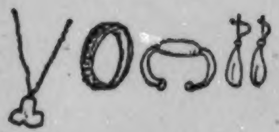
9. hair net



10. coating



11. filter lens



2. jewelry

11 A thin sheet that spreads over the metal during welding and protects the weld.

9 This holds your hair in place.

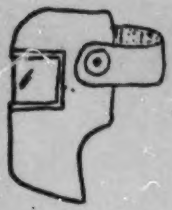
12 Chains and rings not to be worn around machines.

11 A safety colored glass that protects the face from harmful glare.

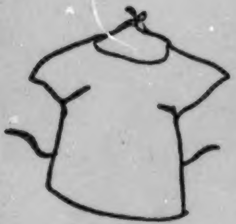
ARC WELDING I
Activity 2
Lesson 2

Name______________________________ Date___________________________

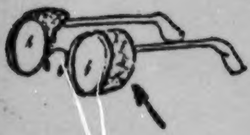
Match the picture and the meaning. Put the right number on the line beside the meaning.



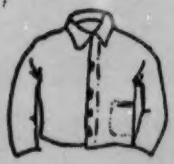
1. helmet



. leather bib



. side shield



. leather jacket

4 A jacket that protects your chest and arms from sparks, spatter, and radiation.

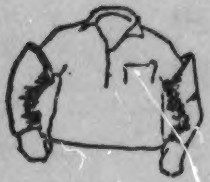
1 A hood with safety glass and colored lens used to protect your head.

3 A guard on the side of goggles that protects the eyes.

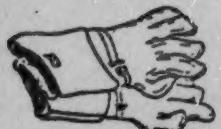
2 Protects your chest from sparks and spatter.

Activity 2 (page 2)

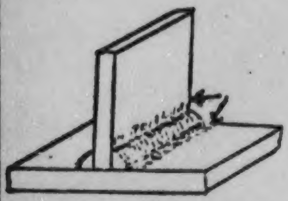
Name______________________________ Date________________________



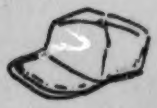
5. leather sleeves



. leather gloves



. slag



. welder's cap

7 Hot waste metal and coating.

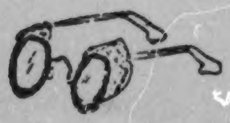
5 Protects your arms from sparks and spatter.

8 Protects your hair and ears from sparks and spatter.

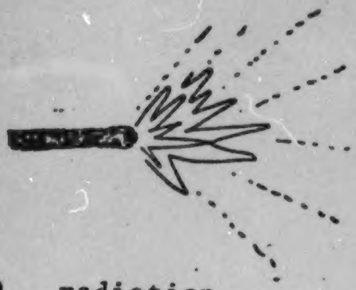
5 These protect your hands.

Activity 2 (page 3)

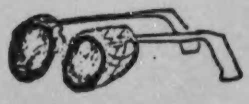
Name________________________ Date________________________



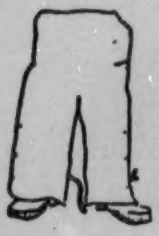
9. safety goggles



10. radiation



1. flash goggles



2. leather leggings

9 Large, clear eyeglasses that protect your eyes.

10 Bright light and heat given off when welding.

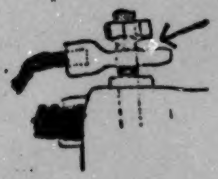
11 Large green-tinted eyeglasses that protect your eyes.

12 A covering used to protect your legs.

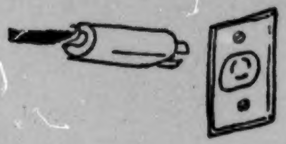
ARC WELDING I
Activity 3
Lesson 3

Name________________________ Date________________________

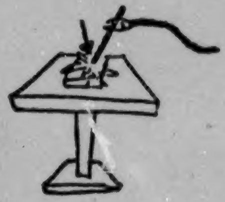
Match the picture and the meaning. Put the right number on the line beside the meaning.



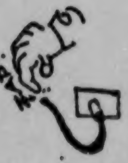
loose connection



disconnect



arc



electric shock

2 To stop the electricity.

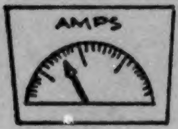
3 The flow of electricity through the air between two points.

4 A jolt of electricity to the body.

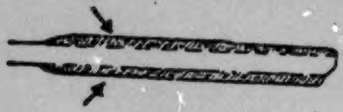
1 A cable connection that is not firmly fastened to the power terminal.

Activity 3 (page 2)

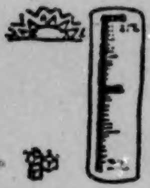
Name________________________ Date________________________



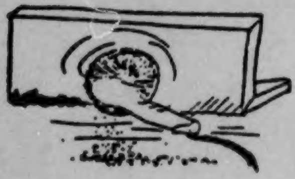
5. amperage



. insulation



. Fahrenheit



. abrasion

8 To wear away by grinding and scraping.

6 Material that does not carry electricity used to prevent short circuits and shocks.

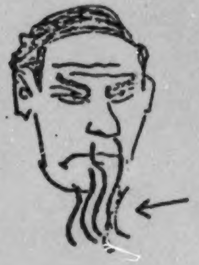
7 A way to measure how hot or cold something is.

5 The amount of electricity that is sent through an arc welding cable.

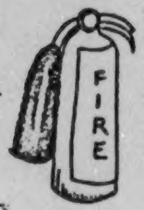
ARC WELDING I
Activity 4
Lesson 4

Name________________________ Date________________________

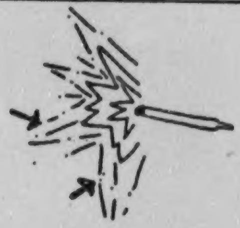
Match the picture and the meaning. Put the right number on the line beside the meaning.



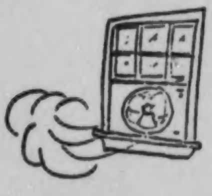
1. toxic fumes



2. fire extinguisher



3. infrared



4. ventilation

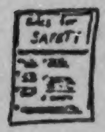
4 To bring in good air and take out bad air.

3 Heat caused by heat rays you cannot see.

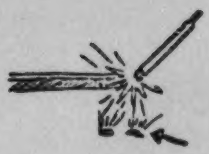
1 Gases or smells that are poison.

2 A tank that holds a special liquid to put out fires.

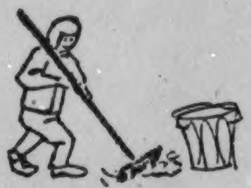
Name______________________________ Date___________________________



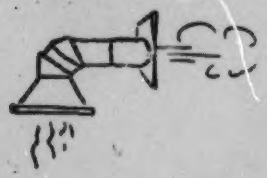
5. safety procedures



6. molten metal



7. housekeeping



8. duct

__5__ Rules to follow to keep from getting hurt.

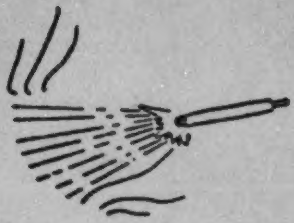
__7__ Keeping the work area clean.

__6__ Metal that becomes liquid when it is very, very hot.

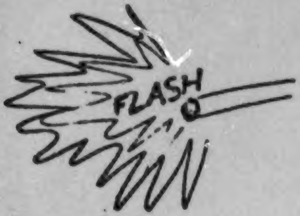
__8__ A tube which removes fumes or liquids from the work area.

Activity 4 (page 3)

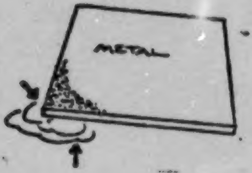
Name____________________ Date____________________



9. ray



10. flash



11. moisture

11 Wetness caused by water or other liquid.

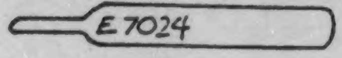
10 A sudden burst of light or heat.

9 A thin line of light or heat that you cannot see.

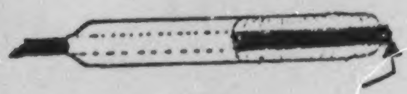
ARC WELDING II
Activity 5
Lesson 5

Name______________________ Date____________________

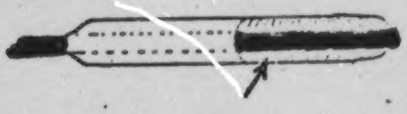
Match the picture and the meaning. Put the right number on the line beside the meaning.



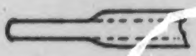
1. electrode



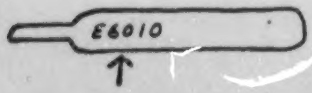
2. filler metal



3. flux coating



4. E-stub



5. electrode code

__3__ The outside of an electrode.

__4__ A piece of an electrode left over after arc welding.

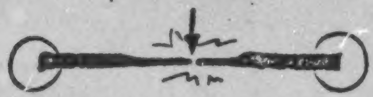
__1__ A melted stick or rod used to join pieces of metal.

__2__ The inside of an electrode.

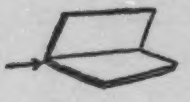
__5__ A set of numbers that tell you the way to arc weld.

Activity 5 (page 2)

Name________________________ Date________________________

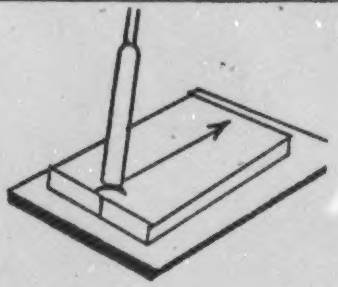


6. tensile strength

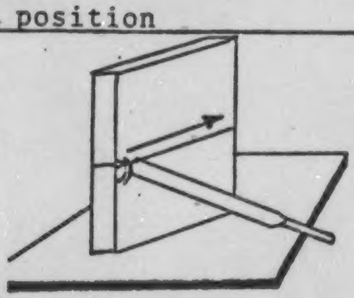


7. position

8. P.S.I.



9. flat position



10. horizontal position

8 The number of pounds of of pressure placed on each square inch of metal.

9 When the metal to be welded lies flat on the table.

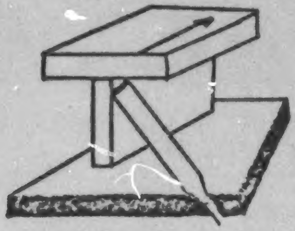
6 The amount of pressure a a weld can take before it breaks.

10 The position when the weld goes straight across from one side to the other.

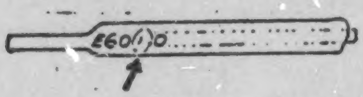
7 The way two pieces of metal are welded together.

Activity 5 (page 3)

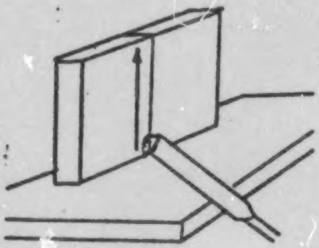
Name________________________ Date________________________



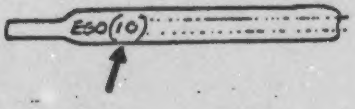
11. overhead position



12. welding position



13. vertical position



14. current

13 The position when you weld the metal nearest the table first and then weld up the joint.

14 The amount of electricity that flows through a wire.

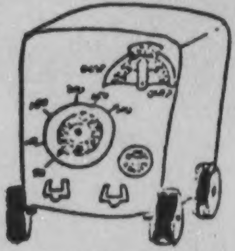
11 The welding is done from the underside of the joint.

12 This is either flat, horizontal, overhead, or vertical.

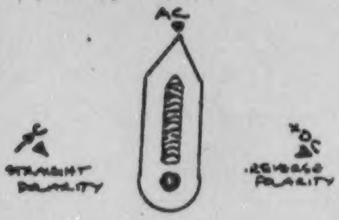
ARC WELDING II
Activity 6
Lesson 6

Name______________________ Date____________________

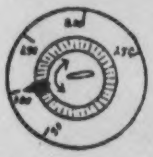
Match the picture and the meaning. Put the right number on the line beside the meaning.



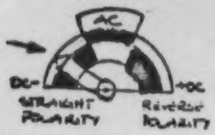
1. arc welding machine


AC
+DC
STRAIGHT POLARITY
REVERSE POLARITY

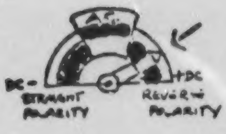
2. polarity switch



3. current control


AC
DC-
+DC
STRAIGHT POLARITY
REVERSE POLARITY

4. DC straight polarity


AC
DC-
+DC
STRAIGHT POLARITY
REVERSE POLARITY

5. DC reverse polarity

__3__ A control that tells how much electric current is coming through the machine.

__1__ A machine that uses electricity to join pieces of metal together.

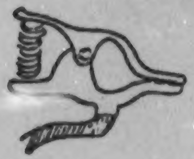
__5__ The kind of electric current that is most often used in arc welding. The electrode is hotter than the work piece.

__2__ The switch on the arc welding machine you turn to point to the kind of current you need for the welding job.

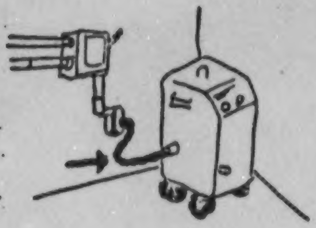
__4__ A kind of electric current used. The work piece is hotter than the electrode.

Activity 6 (page 2)

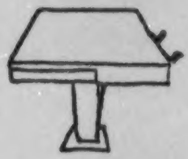
Name____________________________ Date______________________



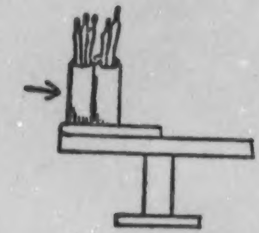
6. ground clamp



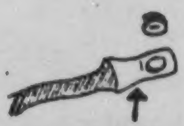
7. power cable



8. welding table



9. E-holder



10. ground cable connector

_9_ A stand used to place the electrode on.

_8_ A steel table used in welding.

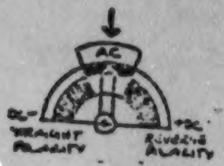
_6_ A tool that connects the ground cable to the metal being welded.

_7_ An insulated cord that brings power from the switch box to the welding machine.

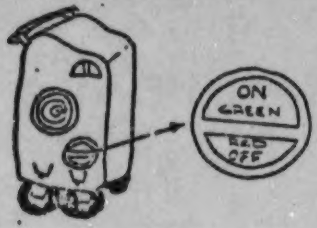
_10_ A round, copper washer that fits onto the end of the ground cable.

Activity 6 (page 3)

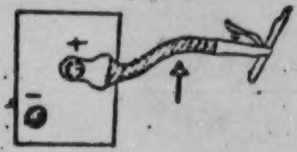
Name____________________ Date____________________


AC
DC-
STRAIGHT POLARITY
+DC
REVERSE POLARITY

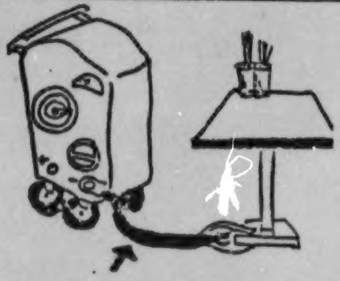
11. A.C.


ON GREEN
RED OFF

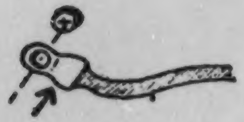
12. on-off switch



13. electrode cable



14. ground cable



15. electrode cable connector

12 The switch that starts and stops the arc welding machine.

13 The wire that goes from the arc welding machine to the electrode holder.

11 A kind of current that spreads the heat evenly between the work piece and the electrode.

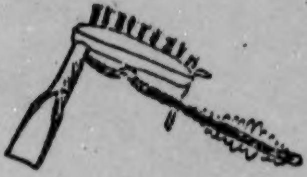
15 A round copper washer that fits onto the end of the electrode cable.

14 A wire that must be connected to both the arc welding machine and the work table.

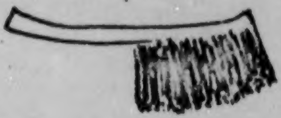
ARC WELDING II
Activity 7
Lesson 7

Name______________________ Date_______________________

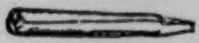
Match the picture and the meaning. Put the right number on the line beside the meaning.



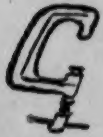
1. hand chipping hammer



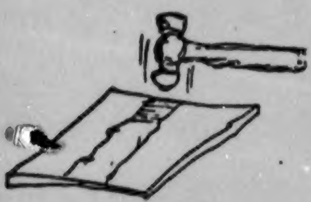
2. cleaning brush



3. chisel



4. C-clamp



5. pein

3 A flat steel cutting tool with a sharp edge and a handle.

1 A tool used to remove slag from a finished weld.

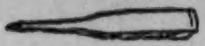
2 A wire brush used to clean slag from a finished weld.

4 A device used to hold metal firmly for welding.

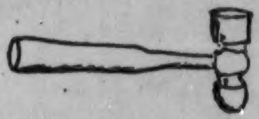
5 To remove bumps on a finished weld by hammering.

Activity 7 (page 2)

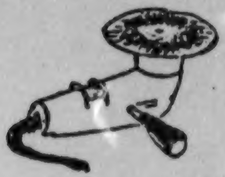
Name____________________ Date______________________



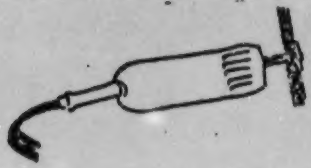
6. center punch



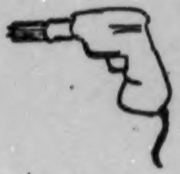
7. ballpein hammer



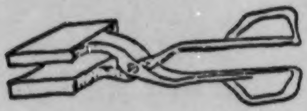
8. disc grinder



9. power cleaning brush



10. air chipping hammer



11. tongs

8 A hand-held tool used to grind welds to a flat finish.

6 A small tool with a round edge used for making punch marks for drilling.

7 A hammer used to pein welds.

9 A brush turned by a motor to remove rust from a weld.

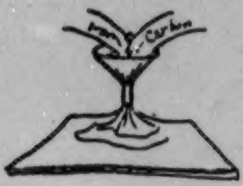
11 A tool used to pick up hot welded metal pieces.

10 A power tool used to remove slag from a finished weld.

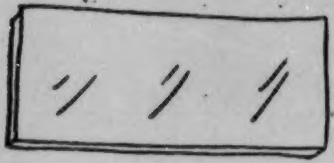
ARC WELDING II
Activity 8
Lesson 8

Name______________________________ Date______________________

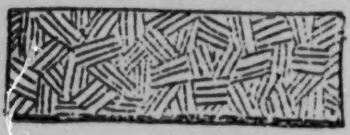
Match the picture and the meaning. Put the right number on the line beside the meaning.



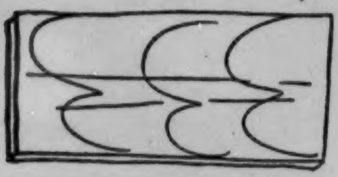
1. alloyed steel



2. cold roll steel



3. galvanized steel



. hot roll steel

3 Steel covered with zinc.

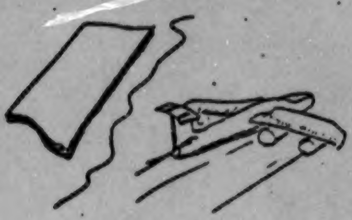
4 Steel with a thin, blue finish that is rolled while it is hot.

84 Steel made from mixing iron with carbon.

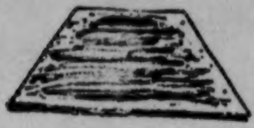
2 Steel with a clean finish rolled while it is cold.

Activity 8 (page 2)

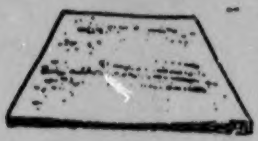
Name________________________ Date________________________



5. aluminum



6. high carbon steel



7. low carbon steel

7 Steel that has only a little carbon it it.

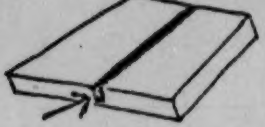
5 A very light-weight metal.

6 Steel that has a lot of carbon it it.

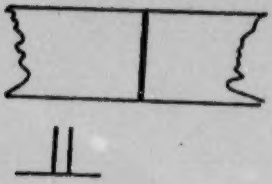
ARC WELDING III
Activity 9
Lesson 9

Name________________________ Date______________________

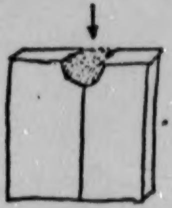
Match the picture and the meaning. Put the right number on the line beside the meaning.



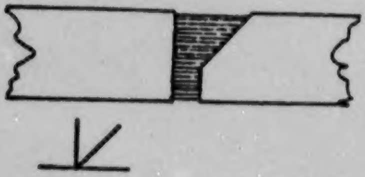
1. groove



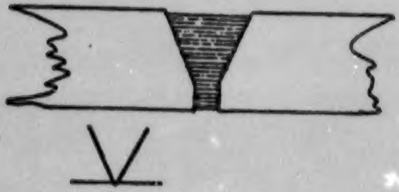
2. square groove



3. groove weld



4. bevel groove



5. V groove

__4__ A way to join thick pieces of metal. The cut is made in only one of the pieces.

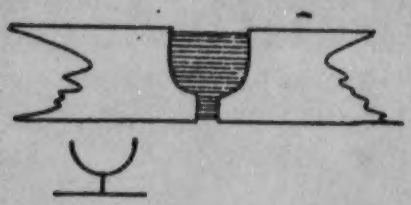
__1__ A cut in the metal.

__2__ A cut used to join pieces of thin metal.

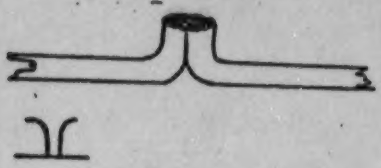
__5__ This cut looks like the letter V.

__3__ A weld made in a space between two pieces of metal.

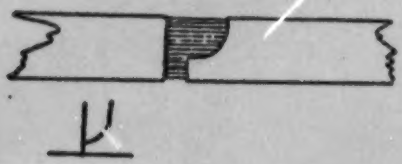
Name________________________ Date______________________



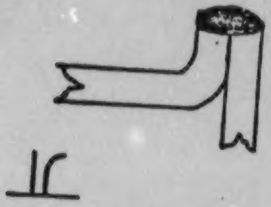
6. U groove



7. flare v groove



8. J groove



9. flare bevel groove

_8_ A cut joining pieces of thick metal that looks like the letter J.

_9_ A way to join thin pieces of metal. Only one of the pieces to be welded is bent.

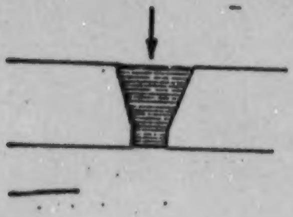
_7_ A way to join thin pieces of metal when both of the pieces are bent.

_6_ A cut joining pieces of thick metal that looks like the letter U.

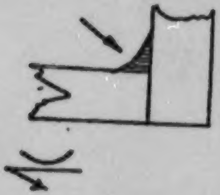
ARC WELDING III
Activity 10
Lesson 10

Name______________________________ Date________________________

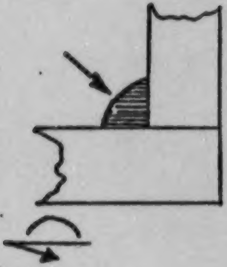
Match the picture and the meaning. Put the right number on the line beside the meaning.



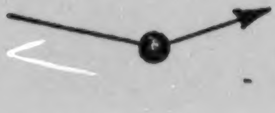
1. flush contour weld



2. concave weld



3. convex weld



4. field weld

__2__ A weld that sinks in the middle

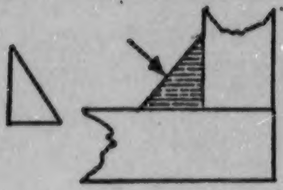
__3__ A weld that rises in the middle.

__1__ A weld that is flat.

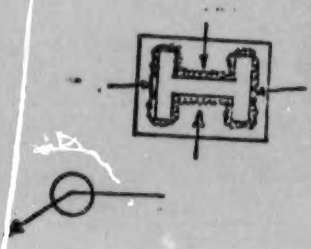
__4__ A weld that is made someplace else than in the shop.

Activity 10 (page 2)

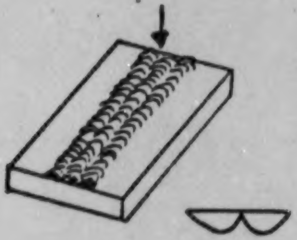
Name________________________ Date____________________



5. fillet weld



6. weld all around



7. surface weld

__7__ A weld that is used to build up worn out parts.

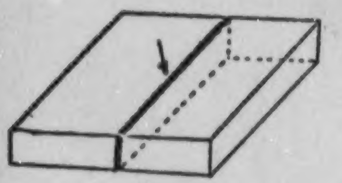
__5__ A weld that makes a square corner.

__6__ To join metal by welding all around the outside of the pieces.

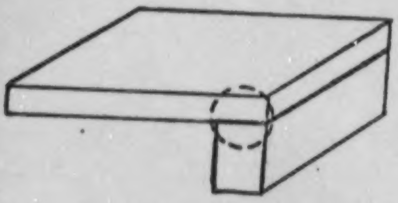
ARC WELDING III
Activity 11
Lesson 11

ne ______________________________. Date ________________________

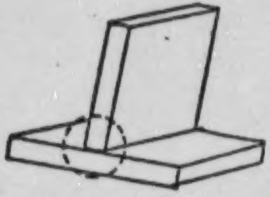
tch the picture and the meaning. Put the right number on the line
ide the meaning.



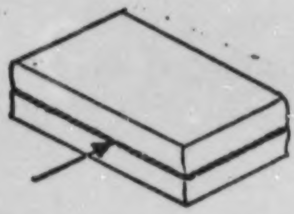
butt joint



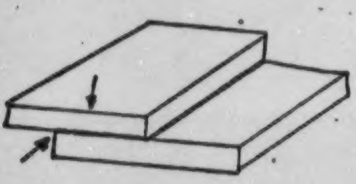
corner joint



tee joint



edge joint



lap joint

__3__ A joint in the shape of the letter T.

__1__ A joint used with pieces of metal that lie side by side.

__2__ A joint in the shape of the letter L.

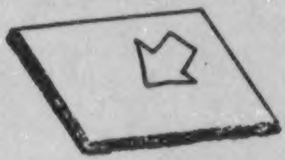
__5__ A joint used when one piece of metal hangs over the other.

__4__ A joint used with pieces of metal that stand side by side

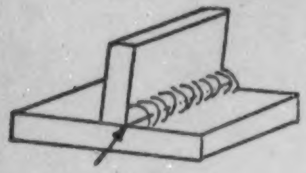
ARC WELDING III
Activity 12
Lesson 12

me ______________________ Date ______________________

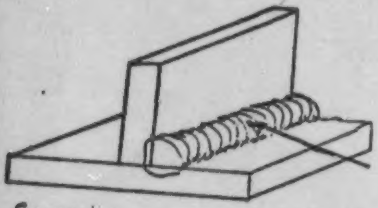
tch the picture and the meaning. Put the right number on the line side the meaning.



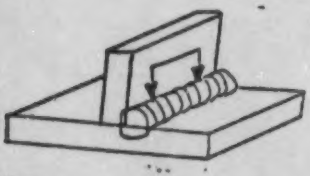
base metal



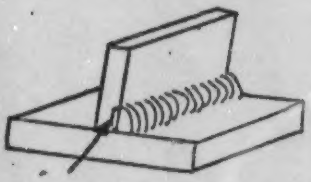
root



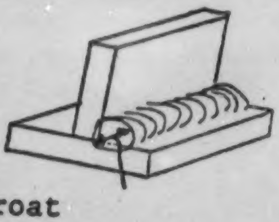
face



toe



leg



throat

3 The raised part of the weld you can see from the side where the welding was done,

1 Metal that is made of iron that is to be welded,

2 The place where the pieces of metal that are to be welded meet each other,

5 The amount of space measured from the root to the toe,

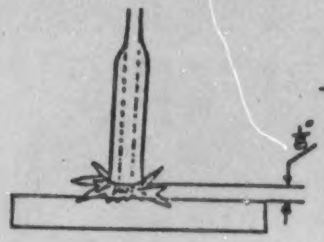
6 The amount of space from the root to the face,

4 Where the raised part of the weld meets the base metal,

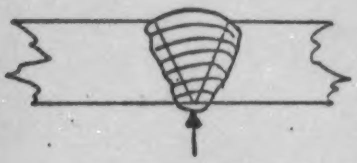
ARC WELDING III
Activity 13
Lesson 13

ne ____________________ Date ____________________

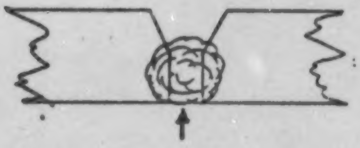
tch the picture and the meaning. Put the right number on the line side the meaning.



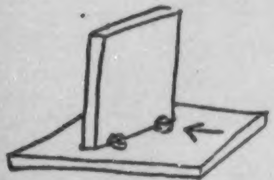
arc length



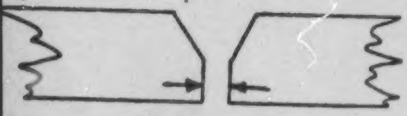
melt through weld



root penetration



tack weld



root opening

4 A small weld that holds parts of metal in place during welding.

5 The amount of space between two pieces of metal to be welded.

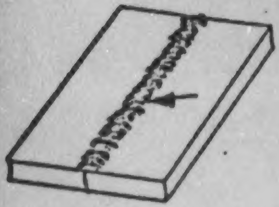
1 The amount of space from the end of the electrode to the place where the arc touches the metal.

2 When the weld metal has gone all the way into the opening and can be seen on the other side.

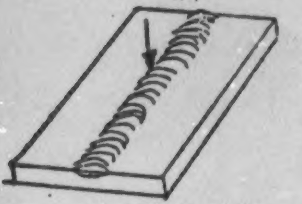
3 How deep the weld goes into the two pieces of metal.

Activity 13 (page 2)

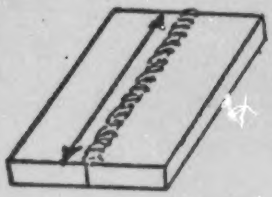
me ____________________ Date ____________________



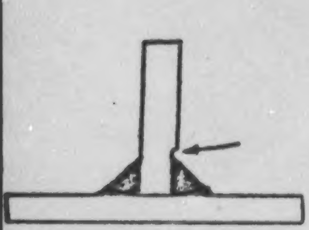
bead



stringer bead



continuous weld



undercut

9 The space near the toe of a weld that is not filled by weld metal.

8 A long string of weld metal that goes from one end of a joint to the other.

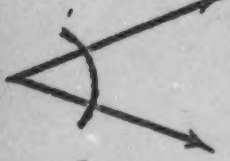
6 Another name for weld metal.

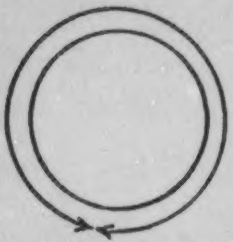
7 A line of drops of weld metal.

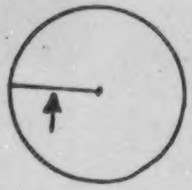
ARC WELDING III
Activity 14
Lesson 14

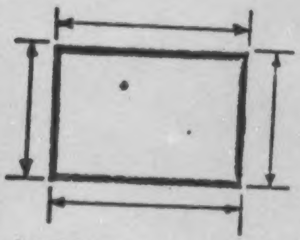
me ______________________. Date ____________________

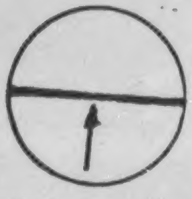
tch the picture and the meaning. Put the right number on the line side the meaning.


angle


circumference


radius


distance


diameter

4 The length around the outside of a figure.

1 The figure made when two lines meet.

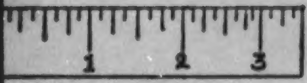
5 The length across the middle of a circle.

2 The distance around the outside of a circle.

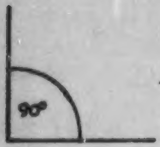
3 The distance from the middle of a circle to the edge.

Activity 14 (page 2)

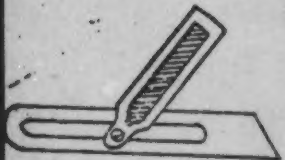
ne ____________________ Date ____________________



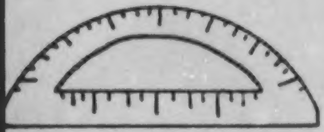
straight edge



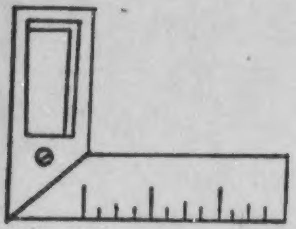
degree



T-bevel



protractor



square

9 A tool used to check right angles.

8 A type of ruler for measuring angles.

6 The name for the size of an angle.

5 Another name for a ruler.

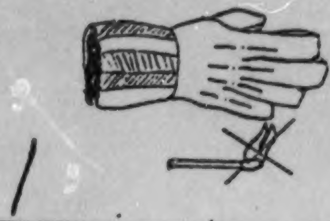
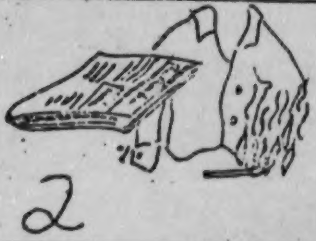
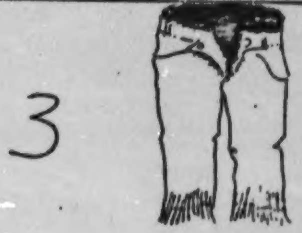
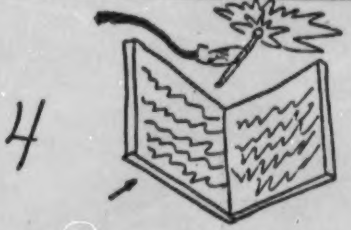
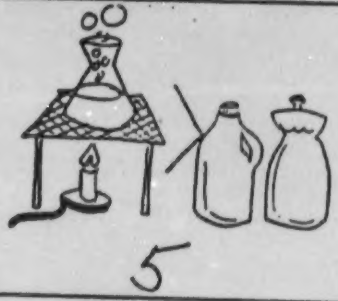
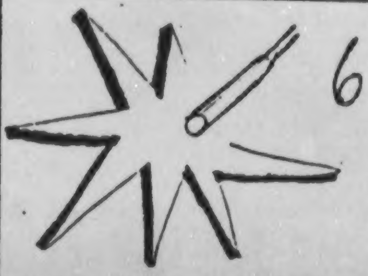
7 A tool used to set the degree of an angle.

ANSWER KEYS
TO
CHECKUP PAGES

ARC WELDING I
Checkup 1
Lesson 1

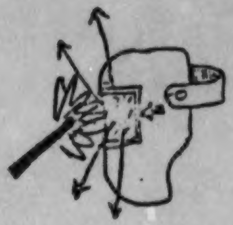
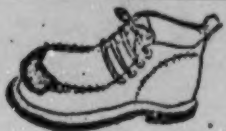
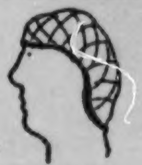
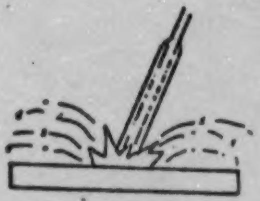
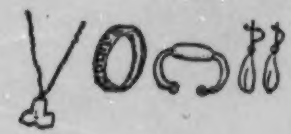
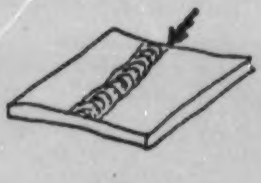
ame________________________ Date________________________

ut the number of the picture next to the word AND next to the meaning.
he first one is done for you.

WORD	PICTURE	MEANING
2 combustible		1 This means that clothes will not burn if touched by fire.
5 synthetic		2 When clothes or other materials burn.
1 non-combustible		3 Threads at the edge of cloth that are loose.
4 heat resistant		4 Clothes or other things that can take some heat without burning.
3 frayed		5 Things that are man-made.
6 glare		6 A very bright light.

Checkup 1 (page 2)

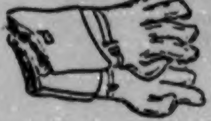
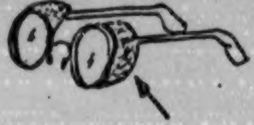
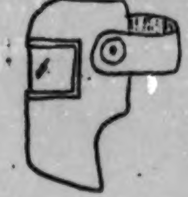
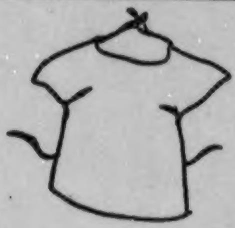
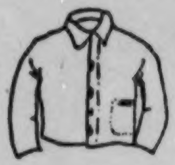
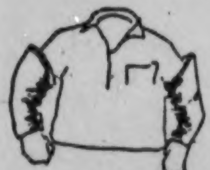
ame______________________ Date______________________

WORD	**PICTURE**	**MEANING**
8 steel toe shoe	 7	9 This holds your hair in place.
10 sparks and spatter	 8	8 A shoe that protects your foot from heavy falling objects.
9 hair net	 9	10 Small burning pieces of metal.
12 coating	 10	7 A safety colored glass that protects the face from harmful glare.
7 filter lens		12 A thin sheet that spreads over the metal during welding and protects the weld.
11 jewelry	 11	11 Chains and rings not to be worn around machines.
	 12	

ARC WELDING I
Checkup 2
Lesson 2

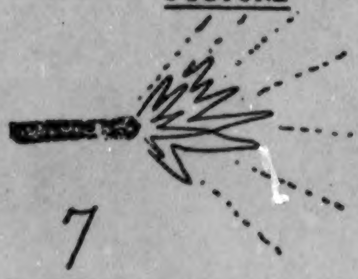
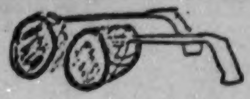
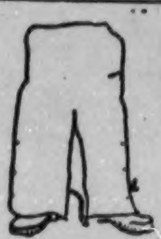
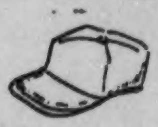
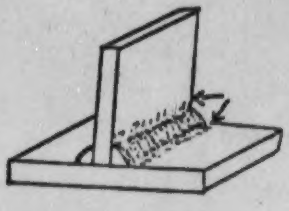
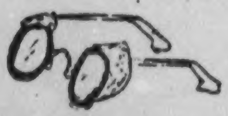
ame________________________ Date________________________

ut the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
3 helmet	 1	5 A jacket that protects your chest and arms from sparks, spatter, and radiation.
4 leather bib	 2	6 Protects your arms from sparks and spatter.
2 side shield	 3	3 A hood with safety glass and colored lens used to protect your head.
5 leather jacket	 4	1 These protect your hands from sparks and spatter.
6 leather sleeves	 5	4 Protects your chest from sparks and spatter.
1 leather gloves	 6	2 A guard on the side of goggles that protects the eyes.

Checkup 2 (Page 2)

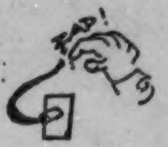
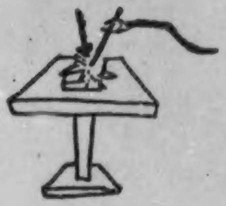
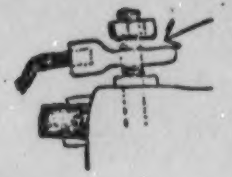
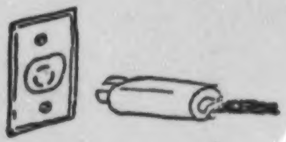
ame_________________________ Date______________________

WORD	PICTURE	MEANING
11 slag	 7	8 Large, green-tinted eyeglasses that protect your eyes.
10 welder's cap	 8	9 A covering used to protect your legs.
12 safety goggles	 9	11 Hot waste metal and coating.
7 radiation	 10	12 Large, clear eyeglasses that protect your eyes.
8 flash goggles	 11	10 Protects your hair and ears from sparks and spatter.
9 leather leggings	 12	7 Bright light and heat given off when welding.

ARC WELDING I
Checkup 3
Lesson 3

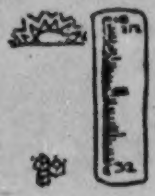
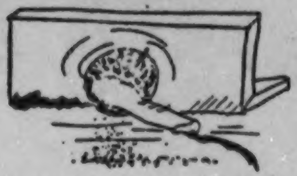
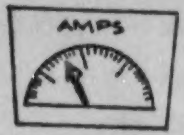
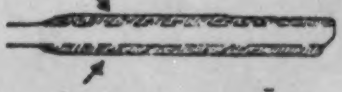
ame_______________ Date_______________

ut the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
3 loose connection	 1	4 To stop the electricity.
4 disconnect	 2	2 The flow of electricity through the air between two points.
2 arc	 3	1 A jolt of electricity to the body.
1 electric shock	 4	3 A cable connection that is not firmly fastened to the power terminal.

Checkup 3 (page 2)

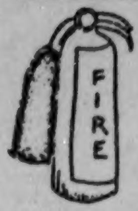
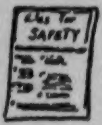
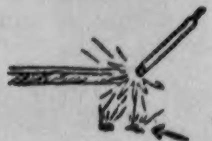
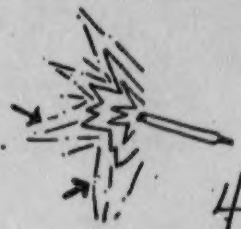
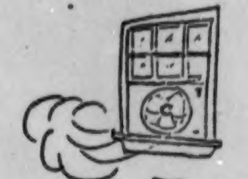
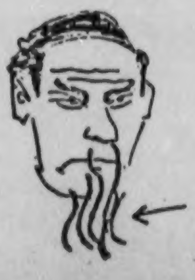
ame____________________ Date____________________

WORD	**PICTURE**	**MEANING**
7 amperage	 5	6 To wear away by grinding and scraping.
8 insulation	 6	8 Material that does not carry electricity, used to prevent short circuits and shocks.
5 Fahrenheit	 7	5 A way to measure how hot or cold something is.
6 abrasion	 8	7 The amount of electricity that is sent through an arc welding cable.

ARC WELDING I
Checkup 4
Lesson 4

ame________________________ Date____________________

ut the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
6 toxic fumes	 1	2 Rules to follow to keep from getting hurt.
1 fire extinguisher	2. 	4 Heat caused by heat rays that you cannot see.
4 infrared	3 	6 Gases or smells that are poison.
5 ventilation	 4	3 Metal that becomes liquid when it is very, very hot.
2 safety procedures	 5	1 A tank that holds a special liquid to put out fires.
3 molten metal	 6	5 To bring in good air and take out bad air.

Checkup 4 (page 2)

ame________________________ Date____________________

WORD

11 housekeeping

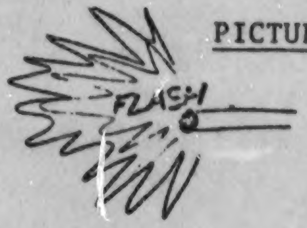
8 duct

0 ray

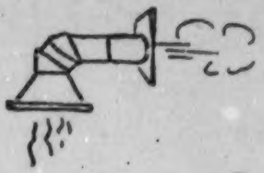
7 flash

9 moisture

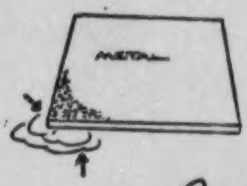
PICTURE



7



8



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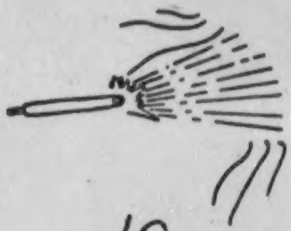

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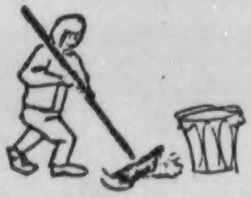


11

MEANING

7 A sudden burst of light or heat.

11 Keeping the work area clean.

9 Wetness caused by water or other liquid.

8 A tube which removes fumes or liquids from the work area.

10 A thin line of light or heat that you cannot see.

ARC WELDING II
Checkup 5
Lesson 5

ame________________________ Date________________________

ut the number of the picture next to the word AND next to the meaning.

WORD

2 electrode

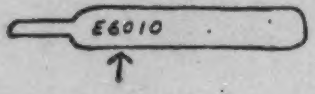
4 filler metal

6 flux coating

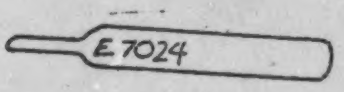
3 E-stub

1 electrode code

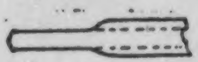
PICTURE



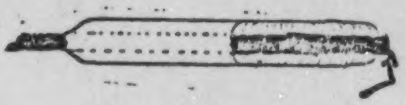
1



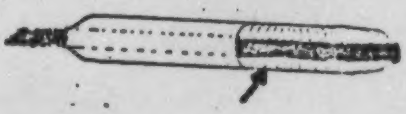
2



3



4



5

MEANING

5 The outside of an electrode.

3 A piece of an electrode left over after arc welding.

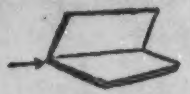
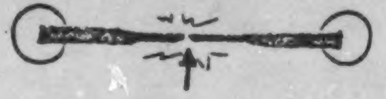
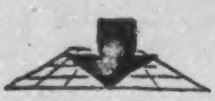
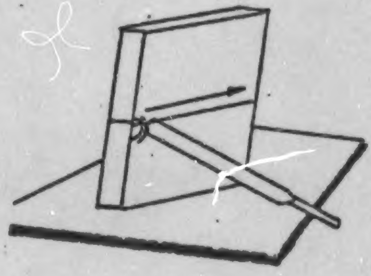
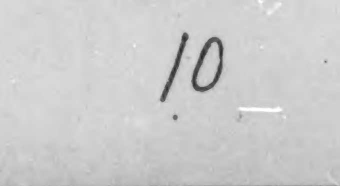
2 A melted stick or rod used to join pieces of metal.

4 The inside of an electrode.

1 A set of numbers that tell you the way to arc weld.

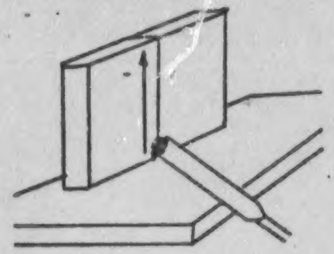
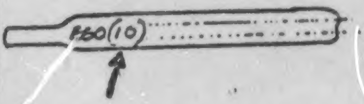
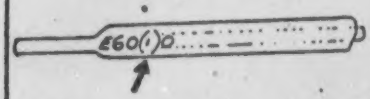
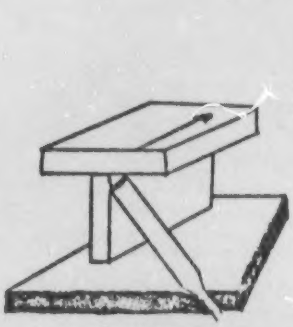
Checkup 5 (page 2)

ame______________________ Date______________________

WORD	PICTURE	MEANING
7 tensile strength	 6	8 The number of pounds of pressure placed on each square inch of metal.
6 position	 7	10 When the metal to be welded lies flat on the table.
8 P.S.I.	 8	7 The amount of pressure a weld can take before it breaks.
0 flat position	 9	9 The position when the weld goes straight across from one side to the other.
9 horizontal position	 10	6 The way two pieces of metal are welded together.

Checkup 5 (page 3)

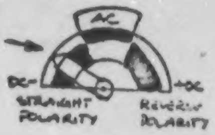
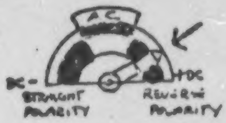
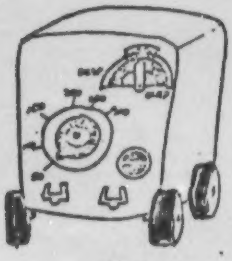
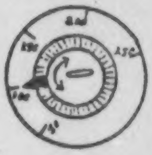
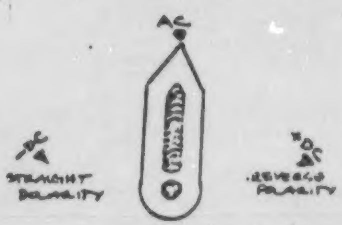
ame____________________ Date____________________

WORD	PICTURE	MEANING
14 overhead position	 11	11 The position when you weld the metal nearest the table first and then weld up the joint.
13 welding position		12 The amount of electricity that flows through a wire.
11 vertical position	 12	14 The welding is done from the underside of the joint.
12 current	 13	13 This is either flat, horizontal, overhead, or vertical.
	 14	

ARC WELDING II
Checkup 6
Lesson 6

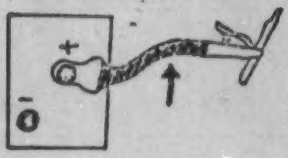
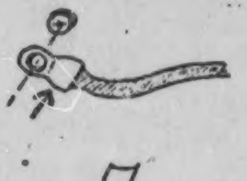
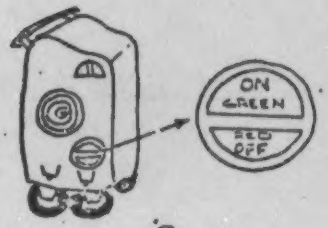
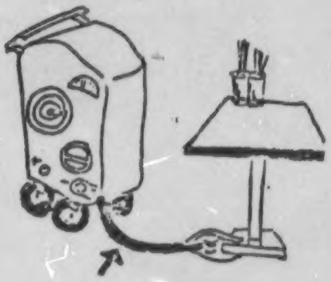
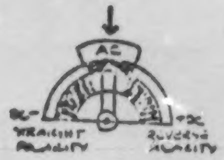
ame________________________ Date________________________

ut the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
3 arc welding machine	 AC DC- STRAIGHT POLARITY +DC REVERSE POLARITY 1	4 A control that tells how much electric current is coming through the machine.
5 polarity switch	 AC DC- STRAIGHT POLARITY +DC REVERSE POLARITY 2	3 A machine that uses electricity to join pieces of metal together.
4 current control	 3	2 The kind of electric current that is most often used in arc welding. The electrode is hotter than the work piece.
1 DC straight polarity	 4	5 The switch on the arc welding machine you turn to point to the kind of current you need for the welding job.
2 DC reverse polarity	 AC -DC STRAIGHT POLARITY +DC REVERSE POLARITY 5	1 A kind of electric current used. The work piece is hotter than the electrode.

Checkup 6 (page 2)

ame____________________ Date____________________

WORD	PICTURE	MEANING
10 A.C.	 6	8 The switch that starts and stops the arc welding machine.
8 on-off switch	 7	6 The wire that goes from the arc welding machine to the electrode holder.
6 electrode cable	 ON GREEN RED OFF 8	10 A kind of current that spreads the heat evenly between the work piece and the electrode.
9 ground cable	 9	7 A round copper washer that fits onto the end of the electrode cable.
7 electrode cable connector	 AC DC- STRAIGHT POLARITY +DC REVERSE POLARITY 10	9 A wire that must be connected to both the arc welding machine and the work table.

Checkup 6 (page 3)

ame____________________ Date________________

WORD

15 ground clamp

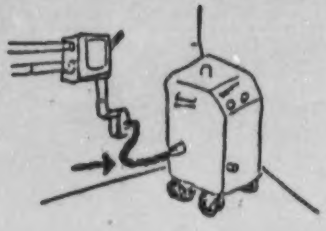
11 power cable

12 welding table

3 E-holder

1 ground cable connector

PICTURE



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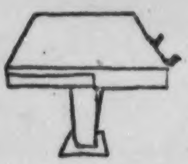

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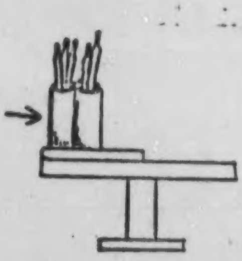

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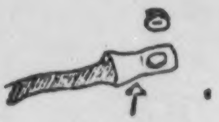

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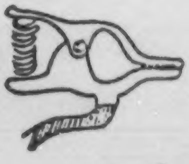


15

MEANING

13 A stand used to place the electrode on.

12 A steel table used in welding.

15 A tool that connects the ground cable to the metal being welded.

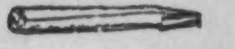
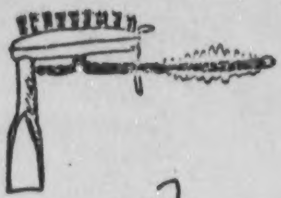
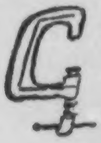
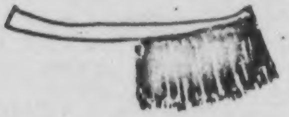
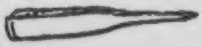
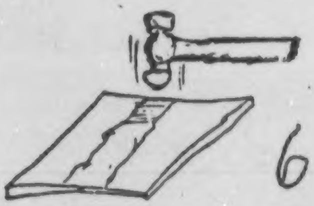
11 An insulated cord that brings power from the switch box to the welding machine.

14 A round, copper washer which fits onto the end of the ground cable.

ARC WELDING II
Checkup 7
Lesson 7

me________________ Date________________

t the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
2 hand chipping hammer	 1	1 A flat steel cutting tool with a sharp edge and a handle.
cleaning brush	 2	2 A tool used to remove slag from a finished weld.
chisel	 3	4 A wire brush used to clean slag from a finished weld.
C-clamp	 4	5 A small tool with a round edge used for making punch marks for drilling.
pein	 5	3 A device used to hold metal firmly for welding.
center punch	 6	6 To remove bumps on a finished weld by hammering.

Checkup 7 (page 2)

ame________________________ Date ________________

WORD

11 ballpein hammer

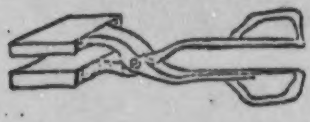
10 disc grinder

8 power cleaning brush

9 air chipping hammer

7 tongs

PICTURE



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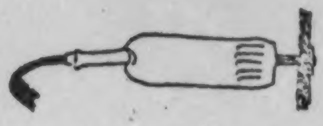

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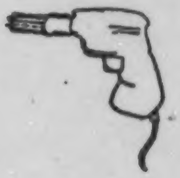

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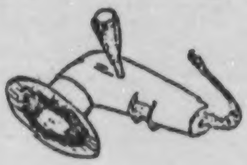

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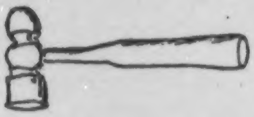


11

MEANING

10 A hand-held tool used to grind welds to a flat finish.

11 A hammer used to pein welds.

8 A brush turned by a motor to remove rust from a weld.

7 A tool used to pick up hot welded metal pieces.

9 A power tool used to remove slag from a finished weld.

ARC WELDING II
Checkup 8
Lesson 8

Name____________________ Date____________________

Put the number of the picture next to the word AND next to the meaning.

WORD

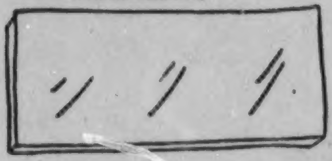
2 alloyed steel

1 cold roll steel

4 galvanized steel

3 hot roll steel

PICTURE



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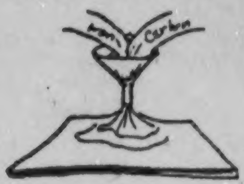

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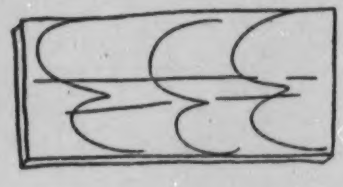

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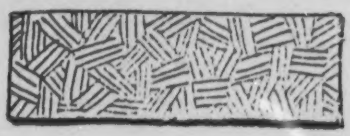


4

MEANING

4 Steel covered with zinc.

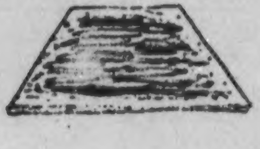
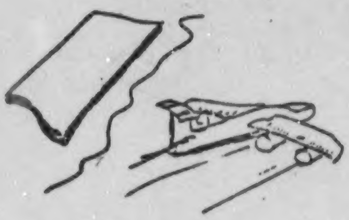
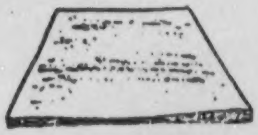
3 Steel with a thin, blue finish that is rolled while it is hot.

2 Steel made from mixing iron with carbon.

1 Steel with a clean finish rolled while it is cold.

Checkup 8 (page 2)

Name____________________ Date____________________

WORD	PICTURE	MEANING
6 aluminum	 5	7 Steel that has only a little carbon in it.
5 high carbon steel	 6	6 A very light-weight metal.
7 low carbon steel	 7	5 Steel that has a lot of carbon in it.

ARC WELDING III
Checkup 9
Lesson 9

Name________________________ Date______________________

Put the number of the picture next to the word AND next to the meaning.

WORD

5 groove

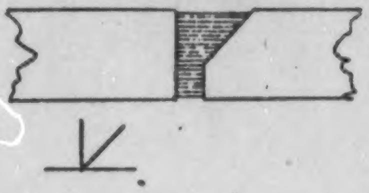
3 square groove

4 groove weld

1 bevel groove

2 V groove

PICTURE



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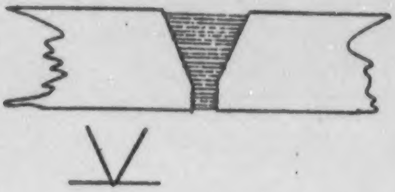

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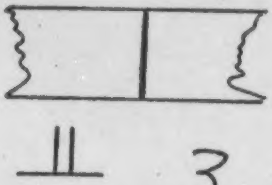

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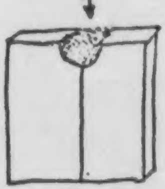

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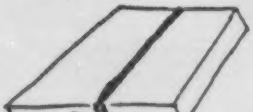


5

MEANING

1 A way to join thick pieces of metal. The cut is made in only one of the pieces.

5 A cut in the metal.

3 A cut used to join pieces of thin metal.

2 This cut looks like the letter V.

4 A weld made in a space between two pieces of metal.

Checkup 9 (page 2)

Name ____________________ Date ____________________

WORD

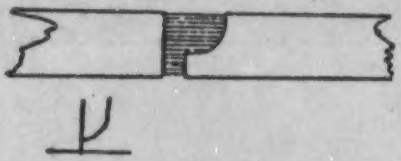
8 U groove

9 flare v groove

6 J groove

7 flare bevel groove

PICTURE



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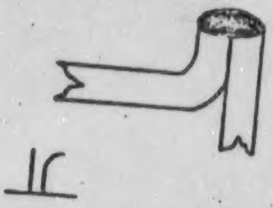

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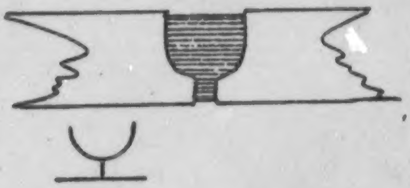

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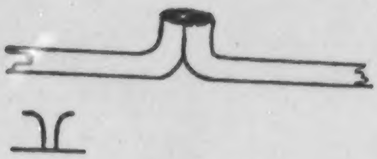


9

MEANING

6 A cut joining pieces of thick metal that looks like the letter J.

7 A way to join thin pieces of metal. Only one of the pieces to be welded is bent.

9 A way to join thin pieces of metal when both of the pieces are bent.

8 A cut joining pieces of thick metal that looks like the letter U.

ARC WELDING III
Checkup 10
Lesson 10

Name____________________ Date____________________

Put the number of the picture next to the word AND next to the meaning.

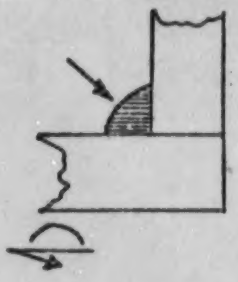
WORD

3 flush contour weld

2 concave weld

1 convex weld

PICTURE



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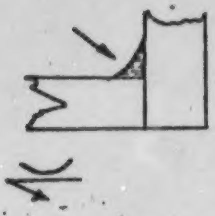

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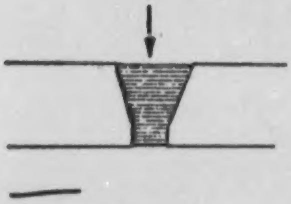


3

MEANING

2 A weld that sinks in the middle.

1 A weld that rises in the middle.

3 A weld that is flat.

Checkup 10 (page 2)

Name________________________ Date__________________

WORD

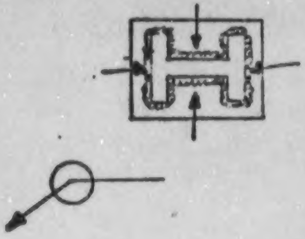
7 field weld

5 fillet weld

4 weld all around

6 surface weld

PICTURE



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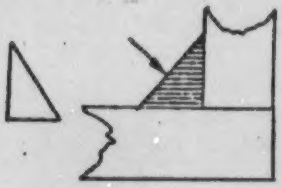

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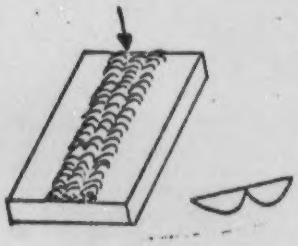

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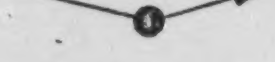


7

MEANING

6 A weld used to build up worn out parts.

7 A weld that is made someplace else than in the shop.

5 A weld that makes a square corner.

4 To join metal by welding all around the outside of the pieces.

ARC WELDING III
Checkup 11
Lesson 11

Name______________________________ Date__________________________

Put the number of the picture next to the word AND next to the meaning.

WORD

3 butt joint

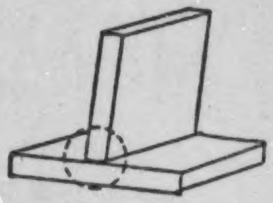
5 corner joint

1 tee joint

2 edge joint

4 lap joint

PICTURE



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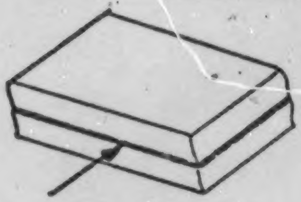

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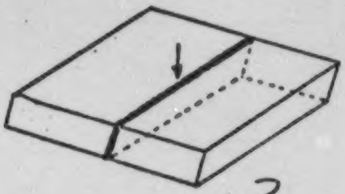

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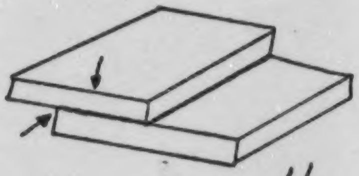

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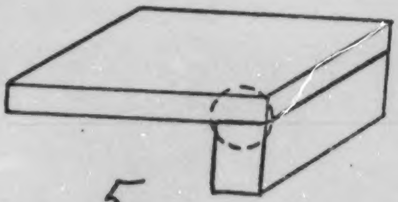


5

MEANING

1 A joint in the shape of the letter T.

3 A joint used with pieces of metal that lie side by side.

5 A joint in the shape of the letter L.

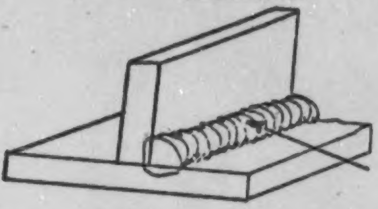
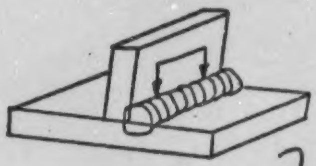
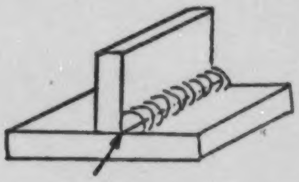
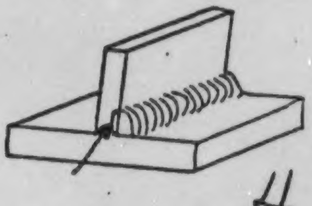
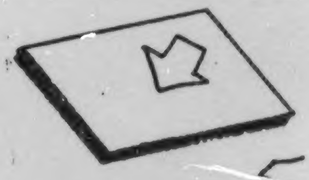
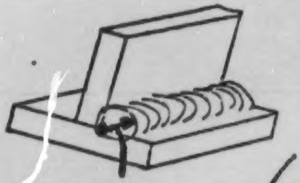
4 A joint used when one piece of metal hangs over the other.

2 A joint used with pieces of metal that stand side by side.

ARC WELDING III
Checkup 12
Lesson 12

Name________________________ Date____________________

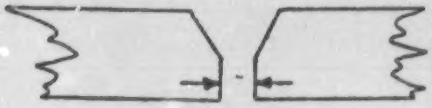
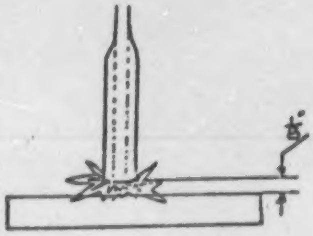
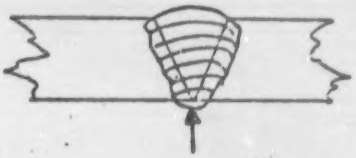
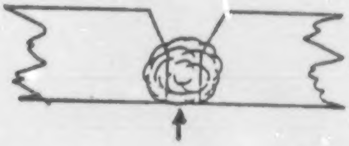
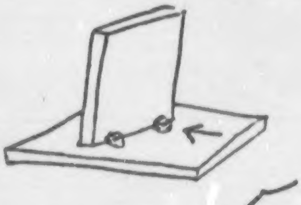
Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
5 base metal	 1	1 The raised part of the weld you can see from the side where the welding was done.
3 root	 2	5 Metal that is made of iron that is to be welded.
1 face	 3	3 The place where the pieces of metal that are to be welded meet each other.
2 toe	 4	4 The amount of space measured from the root to the toe.
4 leg	 5	6 The amount of space from the root to the face.
6 throat	 6	2 Where the raised part of the weld meets the base metal.

ARC WELDING III
Checkup 13
Lesson 13

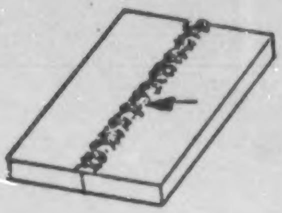
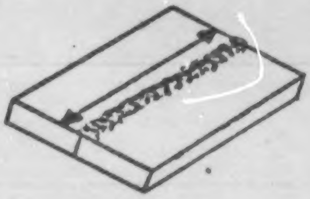
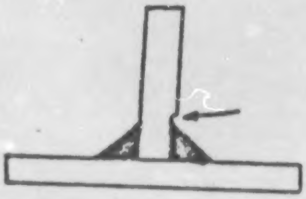
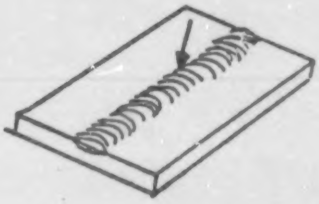
Name________________________ Date______________________

Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
2 arc length	 1	5 A small weld that holds parts of metal in place during welding.
3 melt through weld	 2	1 The amount of space between two pieces of metal to be welded.
4 root penetration	 3	2 The amount of space from the end of the electrode to the place where the arc touches the metal.
5 tack weld	 4	3 When the weld metal has gone all the way into the opening and can be seen on the other side.
1 root opening	 5	4 How deep the weld goes into the two pieces of metal.

Checkup 13 (page 2)

Name____________________________ Date________________________

WORD	PICTURE	MEANING
6 bead	 6	8 The space near the toe of a weld that is not filled by weld metal.
9 stringer bead	 7	7 A long string of weld metal that goes from one end of a joint to the other.
7 continuous weld	 8	6 Another name for weld metal.
8 undercut	 9	9 A line of drops of weld metal.

ARC WELDING III
Checkup 14
Lesson 14

Name

Date

Put the number of the picture next to the word AND next to the meaning.

WORD

5 angle

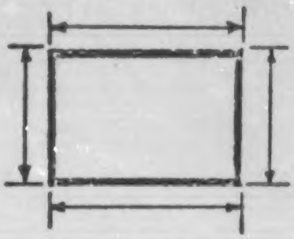
4 circumference

2 radius

1 distance

3 diameter

PICTURE



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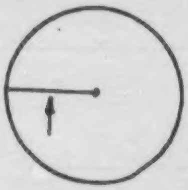

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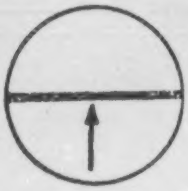

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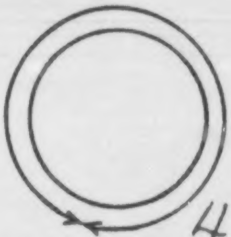

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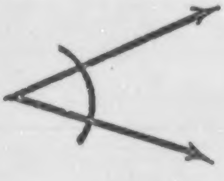


5

MEANING

1 The length around the outside of a figure.

5 The figure made when two lines meet.

3 The length across the middle of a circle.

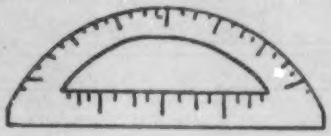
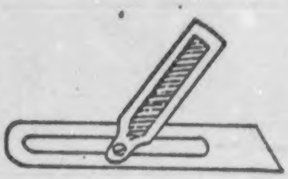
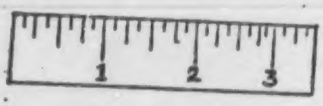
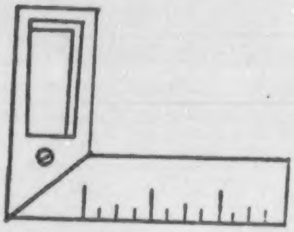
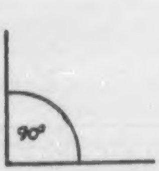
4 The distance around the outside of a circle.

2 The distance from the middle of a circle to the edge.

Checkup 14 (page 2)

Name

Date

WORD	PICTURE	MEANING
8 straight edge	 6	9 A tool used to check right angles.
10 degree	 7	6 A type of ruler for measuring angles.
7 T-bevel	 8	10 The name for the size of an angle.
6 protractor	 9	8 Another name for a ruler.
9 square	 10	7 A tool used to set the degree of an angle.

APPENDIX A

PROJECT DESCRIPTION AND PERSONNEL

Project HIRE

PROJECT NUMBER:	498AH70309
PROJECT TITLE:	A Curriculum Management System for Instructing the Handicapped (Project HIRE)
GRANT PERIOD:	August 15, 1977 to June 30, 1979
PROJECT PERSONNEL:	Dr. David C. Gardner, Director Chairman, Department of Business and Career Education Boston University Dr. Grace Joely Cowan, Associate Director Senior Research Associate, Department of Business and Career Education Boston University Dr. Sue Allen Warren, Project Psychologist Chairman, Department of Special Education Boston University
UNIVERSITY STAFF:	Robert Cunningham, Research Assistant Sheila A. Glynn, Administrative Assistant Kim R. Gordon, Senior Research Assistant Jeanne M. Griffith, Secretary Mary L. Higgins, Senior Research Assistant David M. Smith, Research Assistant
CURRICULUM TEAMS:	Blue Hills Regional Vocational Technical High School Sidney Barnsley William J. Coughlan Ronald F. Linari Joseph P. Keefe Technical School Robert Leonard James Lynch Stephen J. McIntosh William A. Walden, Sr. Minuteman Regional Vocational Technical School Janis Broskie Helen T. Gillam Richard H. Lee Gerald H. Less Pamela A. McInness James Amara Nancy McGrath

Whittier Regional Vocational Technical High School
Margaret DeRoche
Nellie Fichera
Kim R. Gordon
Mary L. Higgins
George A. Korn
Patricia Lavin
C. William Leuders

PROJECT OBJECTIVES

The purpose of the project was to develop a curriculum management system for instructing handicapped students enrolled in vocational high schools. A team from each of four vocational technical high schools, consisting of two special needs or resource-room teachers, two vocational teachers, and the director of special needs, worked with university personnel to develop materials in specific vocational areas. Project objectives were to:

1. Develop and test new strategies and standards for utilizing teams of vocational education and special education personnel, supported and directed by university specialists, in the planning, development, and testing of curriculum materials for use in resource rooms as back-up instructional materials for the regular vocational program.

2. Design, develop, field test, and refine these curriculum materials.

3. Disseminate both nationally and locally the findings of the project, including the materials and a description of the management process.

PROJECT PRODUCTS

1. Final Report
2. Curriculum Management Handbook
3. Curriculum Materials

1) Module Areas:

    Allied Health
        Teacher's Manual
        Student Dictionaries #1, #2, #3

    Arc Welding
        Teacher's Manual
        Student Dictionaries #1, #2, #3

    Culinary Arts
        Teacher's Manual
        Student Dictionaries #1, #2, #3

    Graphic Arts
        Teacher's Manual
        Student Dictionaries #1, #2, #3

    Upholstery
        Teacher's Manual
        Student Dictionaries #1, #2, #3

2) Cassette Tapes for Each Lesson

3) Flash Cards

APPENDIX B

SUMMARY OF FIELD TESTING

SUMMARY OF FIELD TESTING

Five regional vocational technical high schools in Massachusetts participated in the preparation and field testing of the Project HIRE materials in the following trade areas: (1) Allied Health, (2) Arc Welding, (3) Culinary Arts, (4) Graphic Arts, and (5) Upholstery.

A total of 87 students were involved in the field testing of the materials; 52 learning handicapped students, who received instruction with the Project HIRE materials, and 35 regular students enrolled in the same vocational programs who were used as a comparison group. The regular students did not use the HIRE materials but received the same instruction in the vocational shop.

Both the learning handicapped students and the regular students took the same vocabulary tests at the beginning of the field testing period. The learning handicapped students then used the HIRE materials in addition to receiving the in-shop and related instruction with the regular students. Both groups were tested again on the same vocabulary terms at the end of the field testing period. The learning handcicapped students made statistically significant progress on the vocabulary words while the regular students did not. There were significant differences between the two groups, with 65% of the learning handicapped students achieving 100% mastery of the terms while none of the regular students achieved 100% mastery.

Of the learning handicapped students, both learning disabled students and educable mentally retarded students made significant gains on the number of words mastered although more learning disabled students reached 100%

mastery. Most of the learning handicapped students were able to get 100% on a lesson with less than 2 trials; however, the educable mentally retarded students sometimes needed more trials.

A complete and detailed analysis of the field testing procedures and findings is contained in Volume I of the Final Report of Project HIRE, entitled Vocational Curriculum Modification: Teaching Technical Language to Learning Handicapped Students. In addition, a complete description of the curriculum management system used to develop the materials is contained in Volume 2 of the Final Report of Project HIRE, entitled Practical Approaches to Curriculum Development: A Management Handbook. Both volumes are available through the ERIC system and are listed in Resources in Education

APPENDIX C

OCCUPATIONAL INFORMATION AND ENTRY-LEVEL JOBS

APPENDIX C

OCCUPATIONAL INFORMATION IN ARC WELDING[1]

Employment Outlook

Job opportunities are expected to be very good for welders in the years ahead. The D.O.T. predicts that employment in this field will increase faster than the average for all occupations through the mid-1980's.

Many welders are union members, but it has only recently been recognized as a separate craft since the skills are used by other craft workers. Consequently, welders belong to many different unions.

Personal skills for welders include good manual dexterity, good eyesight, and good eye-hand coordination. Most employers prefer to hire applicants who have completed a vocational school training program in welding.

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[1] U.S. Department of Labor, Bureau of Labor Statistics. Occupational Outlook Handbook, 1978-79 Edition. Bulletin No. 1955.

APPENDIX C Continued

Entry Level Positions

These modules were developed in cooperation with the arc welding program at Joseph P. Keefe Technical School. The majority of the students who leave this program enter the trade as a WELDER HELPER. The job description[1] is below:

819.687-014 WELDER HELPER

Performs any combination of following duties to assist workers in welding, brazing, and thermal and arc cutting activities. Moves workpieces, tools, and supplies, manually or by handtruck. Lifts, moves and holds, or clamps workpieces to table, into jigs, or into position as directed, manually or by using hoist, pry bars, wrenches, hammer, and wedges. Cleans workpieces to remove impurities, such as slag, rust, and grease, using wire bruch, portable grinder, hand scraper, or chemical solutions. Connects hoses from hand torch to oxygen and fuel gas cylinders or connects cables from power source to electrode holder and workpiece fixture. Starts gasoline engine to activate electric generators. Places workpieces into furnace to preheat for specified time. Removes, tags, or marks and moves finished work. May attach grappling equipment to objects preparatory to movement by crane. May be designated according to type of activity as THERMAL-CUTTER HELPER (welding).

---

[1] U.S. Department of Labor, Employment and Training Administration, Dictionary of Occupational Titles, Fourth Edition, 1977.

APPENDIX C Continued

GENERIC JOB DESCRIPTIONS

APPRENTICE (any ind.)

A worker who learns, according to written or oral contractual agreement, a recognized skilled craft or trade requiring one or more years of on-the-job training through job experience supplemented by related instruction, prior to being considered a qualified skilled worker. High school or vocational school education is often a prerequisite for entry into an apprenticeship program. Provisions of apprenticeship agreement regularly include length of apprenticeship; a progressive scale of wages; work processes to be taught; and amount of instruction in subjects related to the craft or trade, such as characteristics of materials used, physics, mathematics, estimating, and blueprint reading. Apprenticeability of a particular craft or trade is best evidenced by its acceptabiltiy for registration as a trade by a State apprenticeship agency or the Federal Bureau of Apprenticeship and Training. Generally, where employees are represented by a union, apprenticeship programs come under the guidance of joint apprenticeship committees composed of representatives of the employers or the employer association and representatives of the employees. These committees may determine need for apprentices in a locality and establish minimum apprenticeship standards of education, experience, and training. In instances where committees do not exist, apprenticeship agreement is made between apprentice and employer, or an employer group. The title, APPRENTICE, is often loosely used as a synonym for beginner, HELPER (any ind.), or TRAINEE (any ind.). This practice is technically incorrect and leads to confusion in determining what is meant. Typical classifications for apprentices are BLACKSMITH APPRENTICE (forging); MACHINIST APPRENTICE (mach. shop); and PLUMBER APPRENTICE (const.).

HELPER (any ind.)

A worker who assists another worker, usually of a higher level of competence or expertness, by performing a variety of duties, such as furnishing another worker with materials, tools, and supplies; cleaning work area, machines, and equipment; feeding or offbearing machines, holding materials or tools; and performing other routine duties. A HELPER (any ind.) may learn a trade but does so without an agreement with employer that such is the purpose of their relationship. Consequently, the title HELPER (any ind.) is sometimes used as synonym for APPRENTICE (any ind.), a practice that is incorrect technically. A worker whose duties are limited or restricted to one type of activity, such as moving materials from one department to another, feeding machines, removing products from conveyors or machines, or cleaning machines or work areas is not technically a HELPER (any ind.) and is classified according to duties performed as MATERIAL HANDLER (any ind.); MACHINE CLEANER (any ind.); CLEANER, INDUSTRIAL (any ind.). A worker who performs a variety of duties to assist another worker is a HELPER (any ind.) technically and is classified according to worker assisted as BRICKLAYER HELPER (const.); DRY-CLEANER HELPER (clean., dye., & press.).

APPENDIX D

ANNOTATED BIBLIOGRAPHY

ANNOTATED BIBLIOGRAPHY

This is an annotated bibliography of selected materials that can be used by a special education teacher to supplement general vocabulary and technical vocabulary instruction.

Vocabulary Materials in Welding

1. Welding Technology. Vocational Technical Curriculum Laboratory/ Rutgers--The State University, Bldg. 4103, Kilmer Campus, New Brunswick, NJ 08902

This study guide in welding technology is an analysis of welding plus assignments sheets covering related occupational information. It is designed for use in cooperative educational programs where instruction is on an individual basis.

General Vocabulary Materials

1. Across and Down. Scope/Word Skills 1. Readability 4.0 - 6.0. Scholastic Book Service, 904 Sylvan Avenue, Englewood Cliffs, NJ 07632.

Thirty-seven crossword puzzles that teach basic phonics and build vocabulary. Dictionary and table of contents included as well as abbreviations, spelling and punctuation rules.

2. Basic Reading Vocabulary Levels A and B. Filmstrips, workbooks, teacher's edition. Psychotechnics Inc., 1900 Pickwick Avenue, Glenview, IL 60025.

Level A presents 119 words necessary for reading skill achievement of 1.9. Level B presents 149 words necessary for reading skill achievement of 2.9. Exercise I contains the word list and introduces each word for primary recognition and discussion. Words are presented in sentences structured to develop word meaning. Exercise II reintroduces each word and provides for strong sight-meaning associations and overlearning. Exercise III contains a visual tracking exercise. Exercise IV contains the answers to the visual tracking test and provides a basis for sentence writing.

3. Building Basic English Programs. Language Master - 200 prerecorded cards, Bell & Howell, Audio Visual Products Division, 7100 McCormick Road, Chicago, IL 60645.

These materials can be used with almost any grade level in a variety of subject areas. Set A provides a 200 card "Noun and Everyday Thing" set from the Word-Picture Program and a Usage Manual and blank cards. Set B contains a complete 600 card phonic series with word building and word anslysis techniques. The set also includes 90 blank cards, a usage manual, and a program organizer file.

4. English Development Program Set III - Industrial Supplement. 200 prerecorded cards; readability 4.0 - 6.0. Bell & Howell, Audio Visual Products Division, 7100 McCormick Road, Chicago, IL 60645.

A set of 200 cards for use at Junior and Senior High School levels; also for adults in literacy programs and for those learning English as a second language.

5. The Kaleidoscope Readers. Field Educational Publications. Eight different books with five copies of each and a teaching guide for each.

The series range from second grade reading level to ninth grade. Materiasl present high interest level material. Development of skills include: word attack, vocabulary skills, comprehension skills, study skills, and others.

6. Mast Materials. Mast Development Company, Educational Systems Division, 2212 East 12th Street, Davenport, IA 52803, Individual cassettes for Mast Programmed Reader.

Programmed materials to be used with Mast Programmed Instructor. Subject matter includes dictionary skills, vocabulary building, reading skills, 300 commas, spelling, punctuation, and English for the Spanish speaking.

7. Motorcycle Motorcross, Horses Trail Ride, Dune Buggy Rally. Bowmar, 622 Rodier Drive, Glendale, CA 91201. Two games in each area.

Games to use with the Reading Incentive Program (#10 on this list) to reinforce vocabulary. Two to six players.

8. The New Diagnostic Reading Workbooks - Looking Ahead - Grade 6B. Merill Publishing Company, 1300 Alum Creek Drive, Columbus, OH 43216. Workbooks, 6 copies.

Checking and reinforcement of the reading skills emphasized by basal reading programs. Materials provide a progressive learning pattern as well as graduation of lessons according to difficulty. The exercises center around the following skills: fact comprehension, vocabulary development and word mastery, ability to follow directions, extracting main ideas, and independent thinking and evaluation. Materials range from first to sixth grade levels.

9. Reader's Digest New Reading Skill Builder. Reader's Digest Services, Educational Division, Pleasantville, NY 10578. Books and cassettes. Primary, Intermediate (2-6), Advanced (4-10).

Each skill builder contains controlled readability selections, that are illustrated with full color drawings and photographs as well as exercises and questions. The exercises measure comprehension and interpretation, critical and creative reading, word study, vocabulary and other skills appropriate to grade level.

10. Reading Incentive Language Program. Bowmar, 622 Rodier Drive, Glendale CA 91201. 16 kits, 10 books, 1 filmstrip, 1 cassette, and 1 teacher's guide in each kit.

A low-level vocabulary reading program based on high interest themes to involve the "turned off" student and to provide sequential skill development. Interest levels 3-12th grade. Readability 3.0-5.0.

11. Vocabulary Builder Program - Sets I, II, and III. Bell and Howell Audio Visual Products Division, 7100 McCormick Road, Chicago, IL 60645. 200 prerecorded cards in each set.

Basic, intermediate, and advanced sets may be used from the fourth grade through college level. Each set contains the words to be learned, definitions, and correct pronunciation. Alternate dictionary pronunciations are printed on the front of the card.

12. Word Puzzles and Mysteries. Scope Word Skills 2/Scholastic Book Service, 904 Sylvan Avenue, Englewood Cliffs, NJ 07632. Readability 4.0 - 6.0.

A paperbound exercise book with 20 crossword puzzles and 15 word games to develop vocabulary and reinforce spelling. Sixteen mystery stories use the close method of filling blanks to develop stronger identification of the parts of speech.

Prepared by:
Kim Gordon
Research Assistant, Project HIRE

This research was supported by a grant from the U. S. Office of Education, Department of Health, Education and Welfare (Grant No. G00771947). The opinions expressed herein do not necessarily reflect the position or policy of the U. S. Office of Education, and no official endorsement by the U. S. Office of Education should be inferred.

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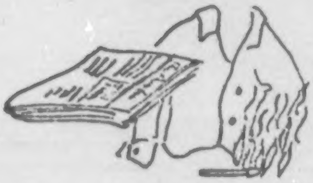
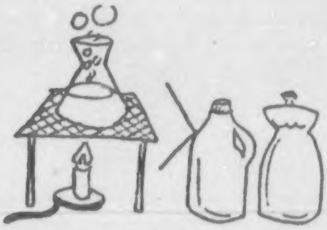
ARC WELDING I
Activity 1
Lesson 1

Name______________________________ Date_________________________

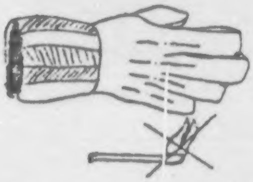
Match the picture and the meaning. Put the right number on the line beside the meaning.



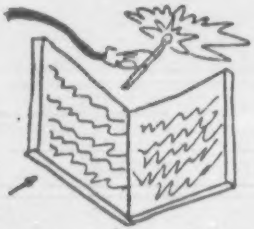
1. combustible



2. synthetic



3. non-combustible



4. heat resistant

_____ Things that are man-made.

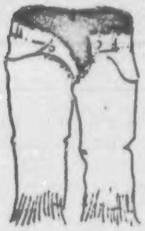
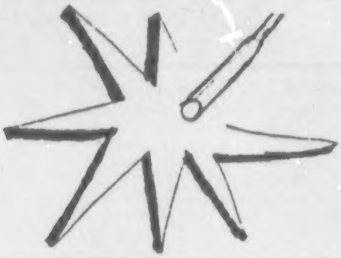
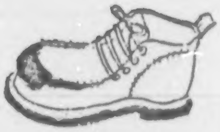
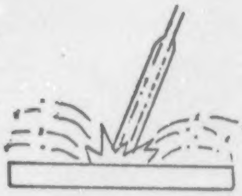
_____ This means that clothes will not burn.

_____ Clothes or other things that can take some heat without burning.

_____ When clothes or other materials burn.

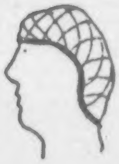
Activity 1 (page 2)

Name____________________ Date______________________

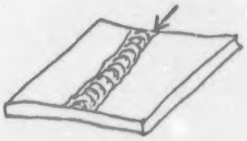
 5. frayed	_____ A very bright light.
 6. glare	_____ Threads at the edge of cloth that are loose.
 7. steel toe shoe	_____ Small burning pieces of metal.
 8. sparks and spatter	_____ A shoe that protects your foot from heavy falling objects.

Activity 1 (page 3)

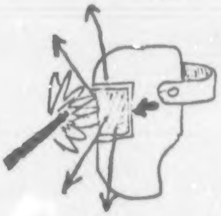
Name____________________ Date____________________



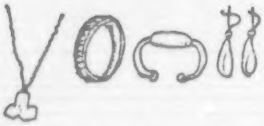
9. hair net



10. coating



11. filter lens



12. jewelry

_____ A thin sheet that spreads over the metal during welding and protects the weld.

_____ This holds your hair in place.

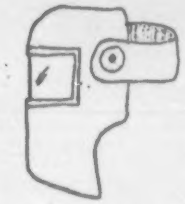
_____ Chains and rings not to be worn around machines.

_____ A safety colored glass that protects the face from harmful glare.

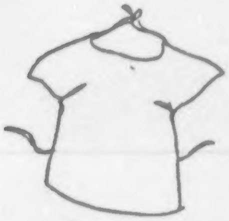
ARC WELDING I
Activity 2
Lesson 2

Name______________________ Date____________________

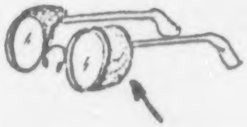
Match the picture and the meaning. Put the right number on the line beside the meaning.



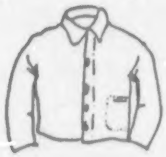
1. helmet



2. leather bib



3. side shield



4. leather jacket

____ A jacket that protects your chest and arms from sparks, spatter, and radiation.

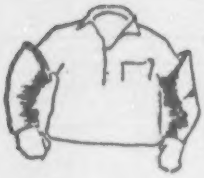
____ A hood with safety glass and colored lens used to protect your head.

____ A guard on the side of goggl that protects the eyes.

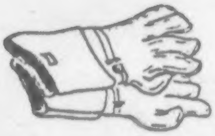
____ Protects your chest from sparks and spatter.

Activity 2 (page 2)

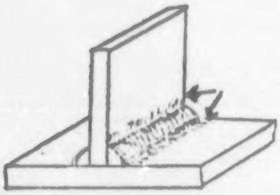
Name________________________ Date____________________



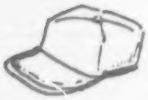
5. leather sleeves



6. leather gloves



7. slag



8. welder's cap

_____ Hot waste metal and coating.

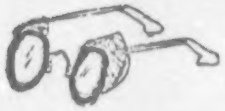
_____ Protects your arms from sparks and spatter.

_____ Protects your hair and ears from sparks and spatter

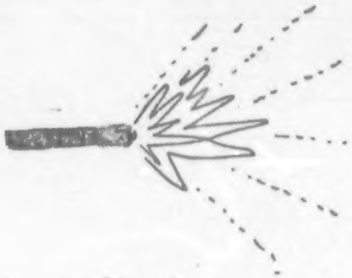
_____ These protect your hands.

Activity 2 (page 3)

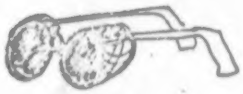
Name________________________ Date________________________



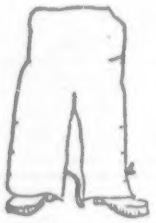
9. safety goggles



10. radiation



11. flash goggles



12. leather leggings

_____ Large, clear eyeglasses that protect your eyes.

_____ Bright light and heat given off when welding.

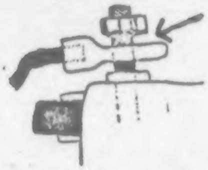
_____ Large, green-tinted eyeglass that protect your eyes.

_____ A covering used to protect your legs.

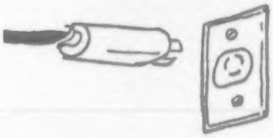
ARC WELDING I
Activity 3
Lesson 3

Name______________________________ Date____________________________

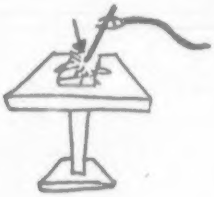
Match the picture and the meaning. Put the right number on the line beside the meaning.



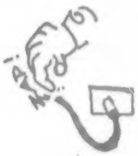
1. loose connection



2. disconnect



3. arc



4. electric shock

_____ To stop the electricity.

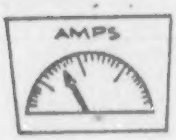
_____ The flow of electricity through the air between two points.

_____ A jolt of electricity to the body.

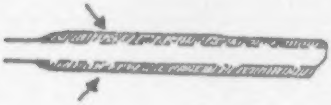
_____ A cable connection that is not firmly fastened to the power terminal.

Activity 3 (page 2)

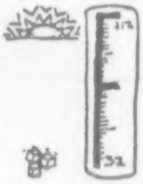
Name________________________ Date________________________



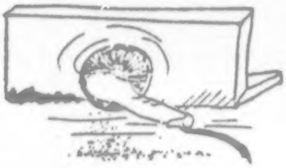
5. amperage



6. insulation



7. Fahrenheit



8. abrasion

_____ To wear away by grinding and scraping.

_____ Material that does not carry electricity used to prevent short circuits and shocks.

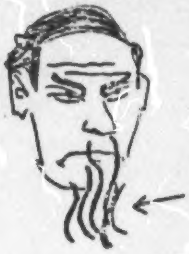
_____ A way to measure how hot or cold something is.

_____ The amount of electricity that is sent through an arc welding cable.

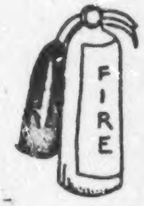
ARC WELDING I
Activity 4
Lesson 4

Name______________________ Date______________________

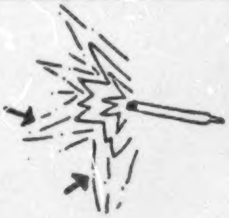
Match the picture and the meaning. Put the right number on the line beside the meaning.



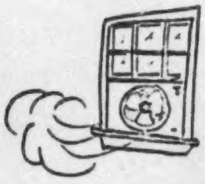
1. toxic fumes



2. fire extinguisher



3. infrared



4. ventilation

_____ To bring in good air and take out bad air.

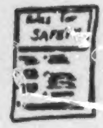
_____ Heat caused by heat rays you cannot see.

_____ Gases or smells that are poison.

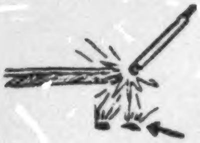
_____ A tank that holds a special liquid to put out fires.

Activity 4 (page 2)

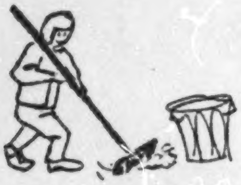
Name______________________ Date______________________



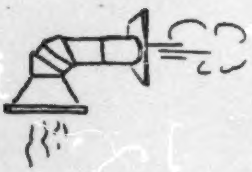
5. safety procedures



6. molten metal



7. housekeeping



8. duct

_____ Rules to follow to keep from getting hurt.

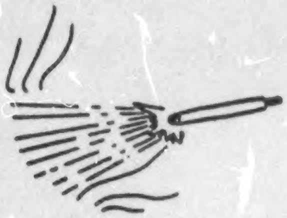
_____ Keeping the work area clean.

_____ Metal that becomes liquid when it is very, very hot.

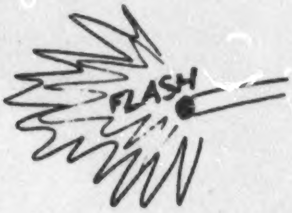
_____ A tube which removes fumes or liquids from the work area.

Activity 4 (page 3)

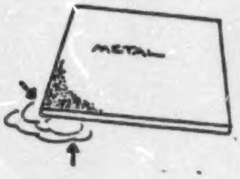
Name______________________ Date______________________



9. ray



10. flash



11. moisture

____ Wetness caused by water or other liquid.

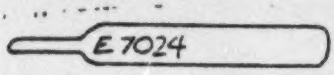
____ A sudden burst of light or heat.

____ A thin line of light or heat that you cannot see.

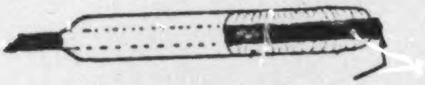
ARC WELDING II
Activity 5
Lesson 5

Name________________________ Date____________________

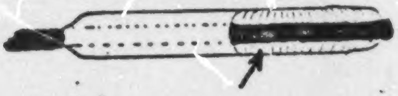
Match the picture and the meaning. Put the right number on the line beside the meaning.



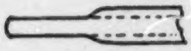
1. electrode



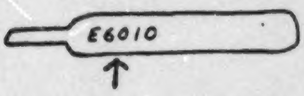
2. filler metal



3. flux coating



4. E-stub



5. electrode code

____ The outside of an electrode.

____ A piece of an electrode left over after arc welding.

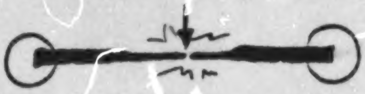
____ A melted stick or rod used to join pieces of metal.

____ The inside of an electrode.

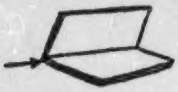
____ A set of numbers that tell you the way to arc weld.

Activity 5 (page 2)

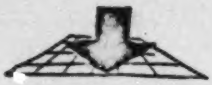
Name________________________ Date________________________



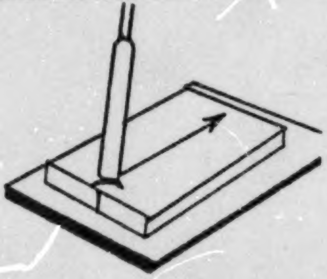
6. tensile strength



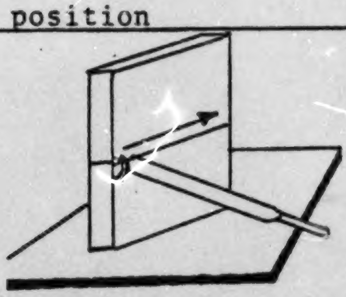
7. position



8. P.S.I.



9. flat position



10. horizontal position

____ The number of pounds of of pressure placed on each square inch of metal.

____ When the metal to be welded lies flat on the table.

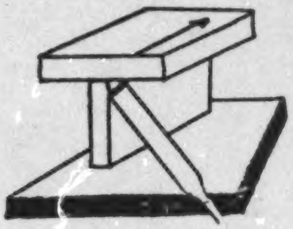
____ The amount of pressure a a weld can take before it breaks.

____ The position when the weld goes straight across from one side to the other.

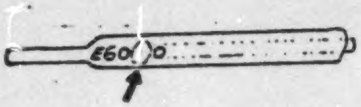
____ The way two pieces of metal are welded together.

Activity 5 (page 3)

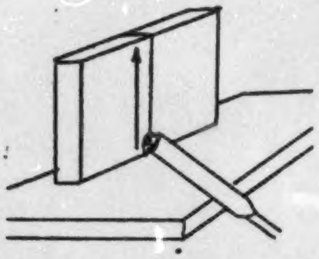
Name____________________ Date____________________



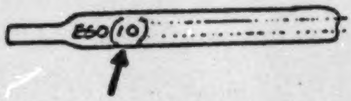
11. overhead position



12. welding position



13. vertical position



14. current

_____ The position when you weld the metal nearest the table first and then weld up the joint.

_____ The amount of electricity that flows through a wire.

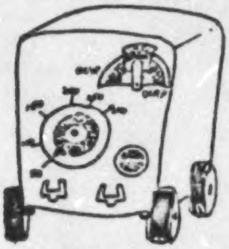
_____ The welding is done from the underside of the joint.

_____ This is either flat, horizontal, overhead, or vertical.

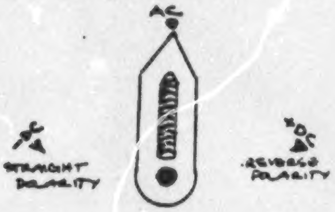
ARC WELDING II
Activity 6
Lesson 6

Name______________________________ Date_________________________

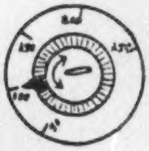
Match the picture and the meaning. Put the right number on the line beside the meaning.



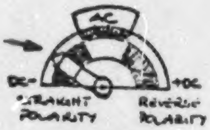
1. arc welding machine


AC
STRAIGHT POLARITY
-DC
REVERSE POLARITY

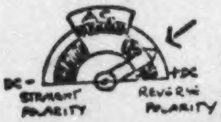
2. polarity switch



3. current control


AC
DC-
+DC
STRAIGHT POLARITY
REVERSE POLARITY

4. DC straight polarity


AC
DC-
+DC
STRAIGHT POLARITY
REVERSE POLARITY

5. DC reverse polarity

_____ A control that tells how much electric current is coming through the machine.

_____ A machine that uses electricity to join pieces of metal together.

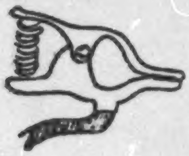
_____ The kind of electric current that is most often used in arc welding. The electrode is hotter than the work piece

_____ The switch on the arc welding machine you turn to point to the kind of current you need for the welding job.

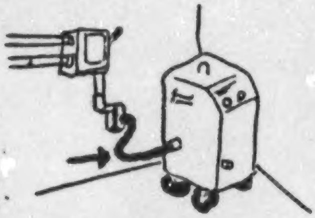
_____ A kind of electric current used. The work piece is hotter than the electrode.

Activity 6 (page 2)

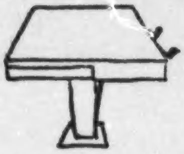
Name____________________ Date____________________



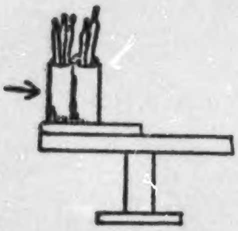
6. ground clamp



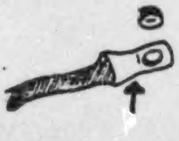
7. power cable



8. welding table



9. E-holder



10. ground cable connector

____ A stand used to place the electrode on.

____ A steel table used in welding.

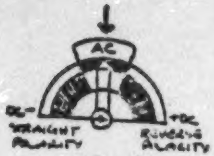
____ A tool that connects the ground cable to the metal being welded.

____ An insulated cord that brings power from the switch box to the welding machine.

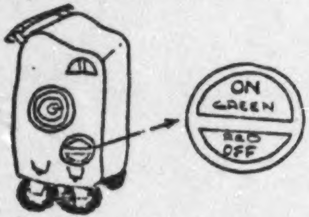
____ A round, copper washer that fits onto the end of the ground cable.

Activity 6 (page 3)

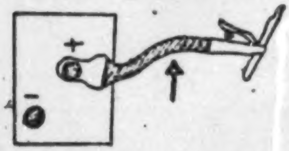
Name____________________ Date____________________


AC
DC-
STRAIGHT POLARITY
+DC
REVERSE POLARITY

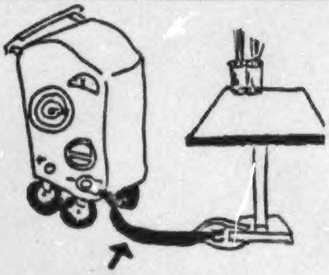
11. A.C.


ON
GREEN
RED
OFF

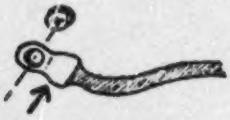
12. on-off switch



13. electrode cable



14. ground cable



15. electrode cable connector

_____ The switch that starts and stops the arc welding machine.

_____ The wire that goes from the arc welding machine to the electrode holder.

_____ A kind of current that spreads the heat evenly between the work piece and the electrode.

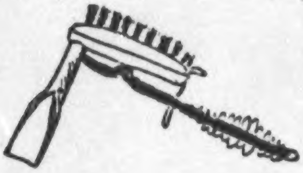
_____ A round copper washer that fits onto the end of the electrode cable.

_____ A wire that must be connected to both the arc welding machine and the work table.

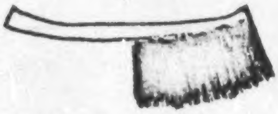
ARC WELDING II
Activity 7
Lesson 7

Name________________________ Date_________________________

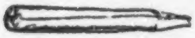
Match the picture and the meaning. Put the right number on the line beside the meaning.



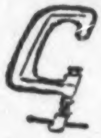
1. hand chipping hammer



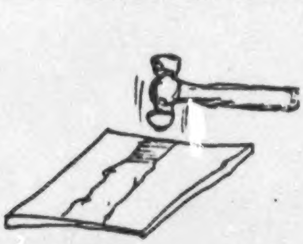
2. cleaning brush



3. chisel



4. C-clamp



5. pein

____ A flat steel cutting tool with a sharp edge and a handle.

____ A tool used to remove slag from a finished weld.

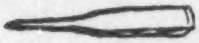
____ A wire brush used to clean slag from a finished weld.

____ A device used to hold metal firmly for welding.

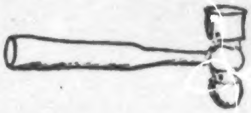
____ To remove bumps on a finished weld by hammering.

Activity 7 (page 2)

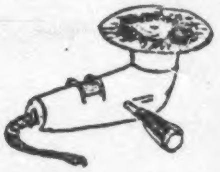
Name________________________ Date________________________



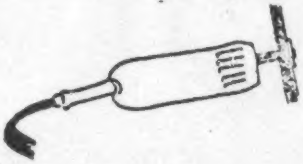
6. center punch



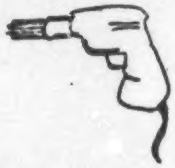
7. ballpein hammer



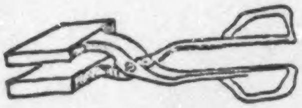
8. disc grinder



9. power cleaning brush



10. air chipping hammer



11. tongs

_____ A hand-held tool used to grin welds to a flat finish.

_____ A small tool with a round edge used for making punch marks for drilling.

_____ A hammer used to pein welds.

_____ A brush turned by a motor to remove rust from a weld.

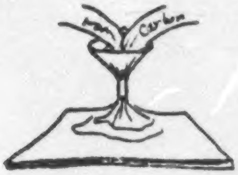
_____ A tool used to pick up hot welded metal pieces.

_____ A power tool used to remove slag from a finished weld.

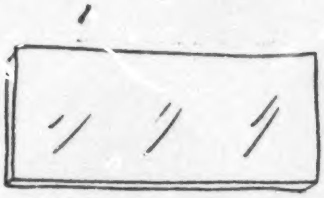
ARC WELDING II
Activity 8
Lesson 8

Name________________________________ Date__________________________

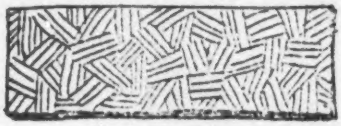
Match the picture and the meaning. Put the right number on the line beside the meaning.



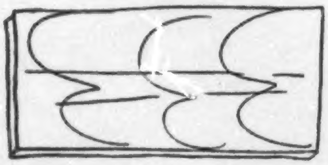
1. alloyed steel



2. cold roll steel



3. galvanized steel



4. hot roll steel

_____ Steel covered with zinc.

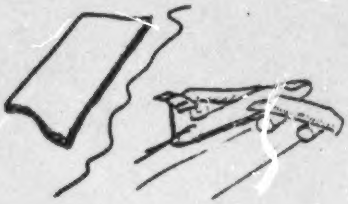
_____ Steel with a thin, blue finish that is rolled while it is hot.

_____ Steel made from mixing iron with carbon.

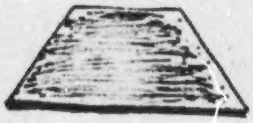
_____ Steel with a clean finish rolled while it is cold.

Activity 8 (page 2)

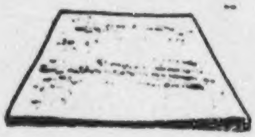
Name______________________ Date______________________



5. aluminum



6. high carbon steel



7. low carbon steel

_____ Steel that has only a little carbon it it.

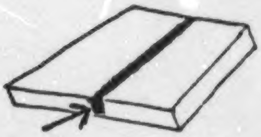
_____ A very light-weight metal.

_____ Steel that has a lot of carbon it it.

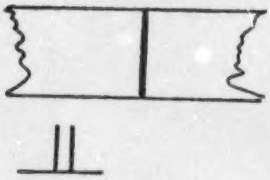
ARC WELDING III
Activity 9
Lesson 9

Name ______________________ Date ______________________

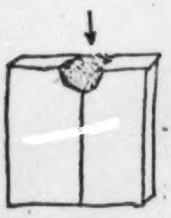
Match the picture and the meaning. Put the right number on the line beside the meaning.



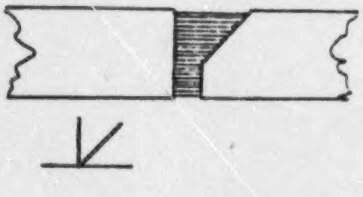
1. groove



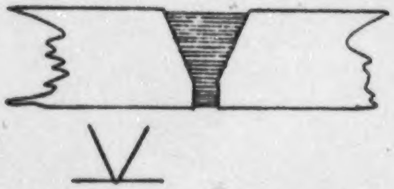
2. square groove



3. groove weld



4. bevel groove



5. V groove

_____ A way to join thick pieces of metal. The cut is made in only one of the pieces.

_____ A cut in the metal.

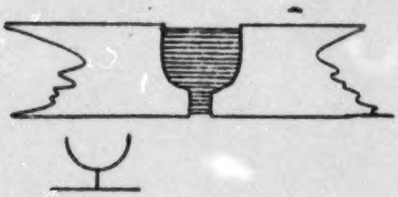
_____ A cut used to join pieces of thin metal.

_____ This cut looks like the letter V.

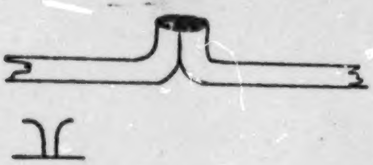
_____ A weld made in a space between two pieces of metal.

Activity 9 (page 2)

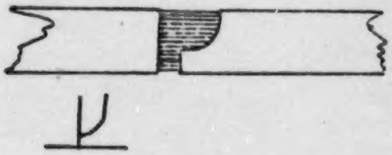
Name________________________ Date____________________



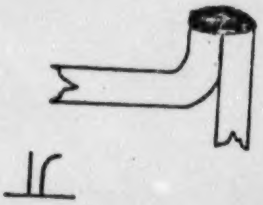
6. U groove



7. flare v groove



8. J groove



9. flare bevel groove

____ A cut joining pieces of thick metal that looks like the letter J.

____ A way to join thin pieces of metal. Only one of the pieces to be welded is bent.

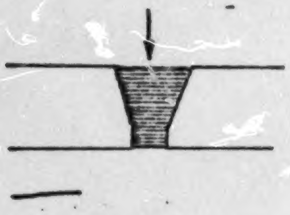
____ A way to join thin pieces of metal when both of the pieces are bent.

____ A cut joining pieces of thick metal that looks like the letter U.

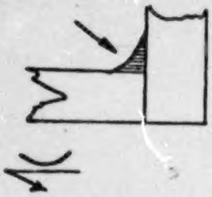
ARC WELDING III
Activity 10
Lesson 10

Name____________________________ Date_______________________

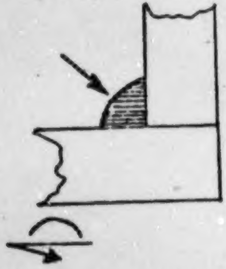
Match the picture and the meaning. Put the right number on the line beside the meaning.



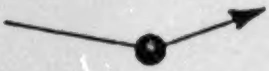
1. flush contour weld



2. concave weld



3. convex weld



4. field weld

_____ A weld that sinks in the middle

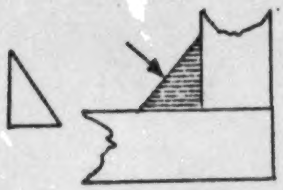
_____ A weld that rises in the middle.

_____ A weld that is flat.

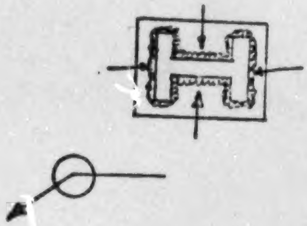
_____ A weld that is made someplace else than in the shop.

Activity 10 (page 2)

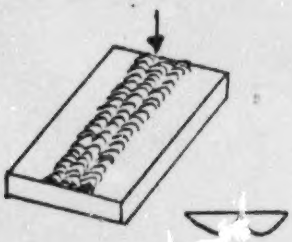
Name______________________________ Date__________________________



5. fillet weld



6. weld all around



7. surface weld

_____ A weld used to build up worn out parts.

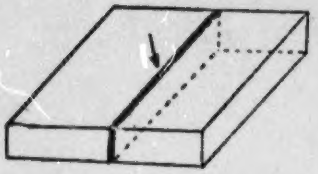
_____ A weld that makes a square corner.

_____ To join metal by welding all around the outside of the pieces.

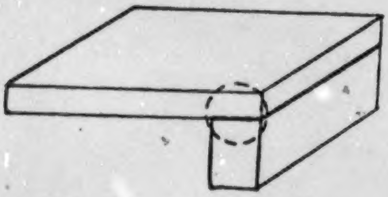
ARC WELDING III
Activity 11
Lesson 11

Name ______________________________ Date ________________________

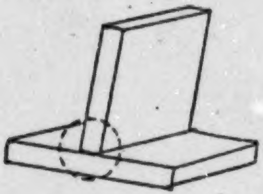
Match the picture and the meaning. Put the right number on the line beside the meaning.



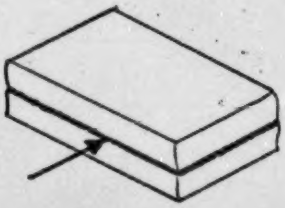
1. butt joint



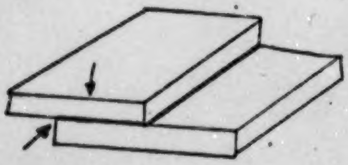
2. corner joint



3. tee joint



4. edge joint



5. lap joint

______ A joint in the shape of the letter T.

______ A joint used with pieces of metal that lie side by side.

______ A joint in the shape of the letter L.

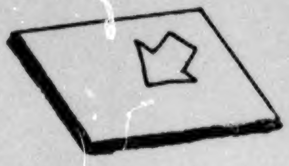
______ A joint used when one piece of metal hangs over the other.

______ A joint used with pieces of metal that stand side by side

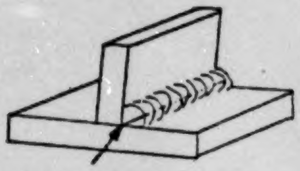
ARC WELDING III
Activity 12
Lesson 12

Name ______________________________ Date ______________________________

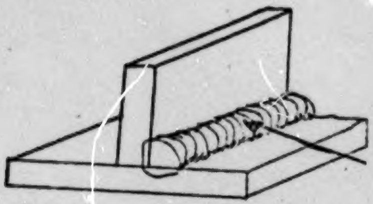
Match the picture and the meaning. Put the right number on the line beside the meaning.



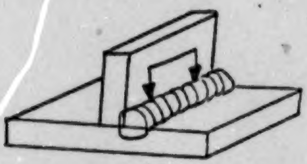
1. base metal



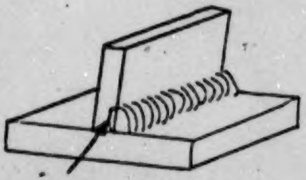
2. root



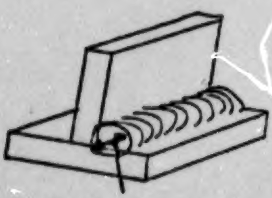
3. face



4. toe



5. leg



6. throat

_____ The raised part of the weld you can see from the side where the welding was done,

_____ Metal that is made of iron that is to be welded,

_____ The place where the pieces of metal that are to be welded meet each other,

_____ The amount of space measured from the root to the toe,

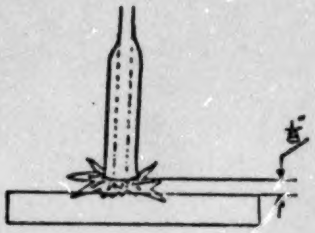
_____ The amount of space from the root to the face,

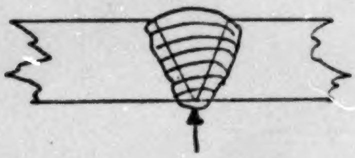
_____ Where the raised part of the weld meets the base metal,

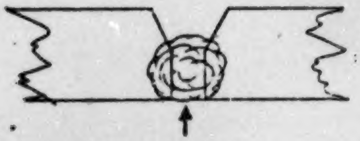
ARC WELDING III
Activity 13
Lesson 13

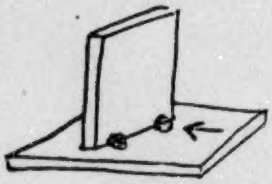
Name ______________________________ Date ____________________

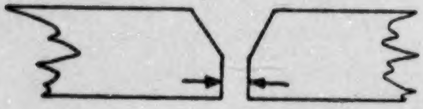
Match the picture and the meaning. Put the right number on the line beside the meaning.


1. arc length


2. melt through weld


3. root penetration


4. tack weld


5. root opening

_____ A small weld that holds parts of metal in place during welding.

_____ The amount of space between two pieces of metal to be welded.

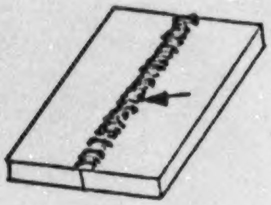
_____ The amount of space from the end of the electrode to the place where the arc touches the metal.

_____ When the weld metal has gone all the way into the opening and can be seen on the other side.

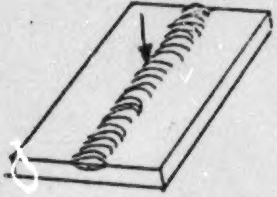
_____ How deep the weld goes into the two pieces of metal.

Activity 13 (page 2)

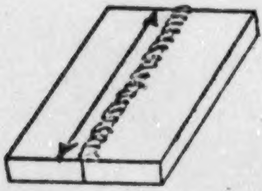
Name ______________________________ Date ____________________



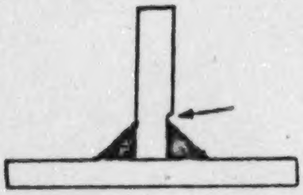
6. bead



7. stringer bead



8. continuous weld



9. undercut

_____ The space near the toe of a weld that is not filled by weld metal.

_____ A long string of weld metal that goes from one end of a joint to the other.

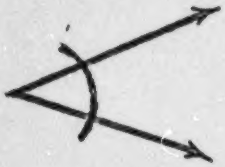
_____ Another name for weld metal.

_____ A line of drops of weld metal.

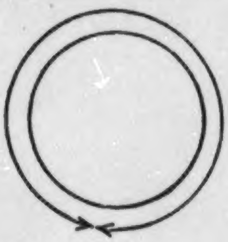
ARC WELDING III
Activity 14
Lesson 14

Name ______________________________ Date _____________________

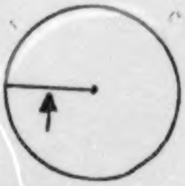
Match the picture and the meaning. Put the right number on the line beside the meaning.



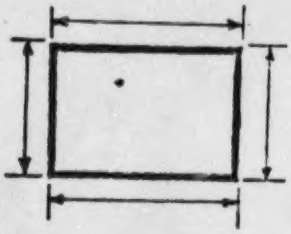
1. angle



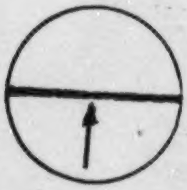
2. circumference



3. radius



4. distance



5. diameter

_____ The length around the outside of a figure.

_____ The figure made when two lines meet.

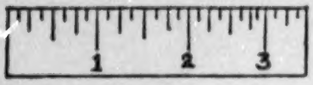
_____ The length across the middle of a circle.

_____ The distance around the outside of a circle.

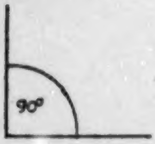
_____ The distance from the middle of a circle to the edge.

Activity 14 (page 2)

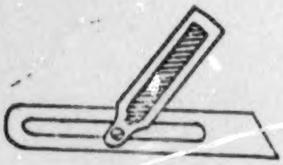
Name ______________________ Date ______________________



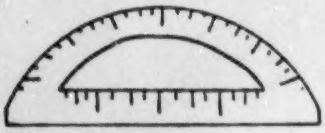
5. straight edge



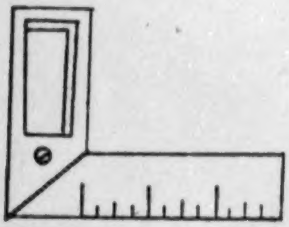
6. degree



7. T-bevel



8. protractor



9. square

_____ A tool used to check right angles,

_____ A type of ruler for measuring angles,

_____ The name for the size of an angle,

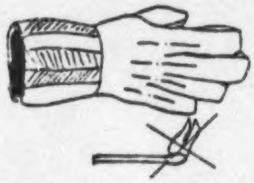
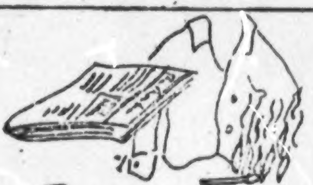
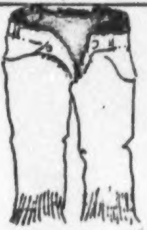
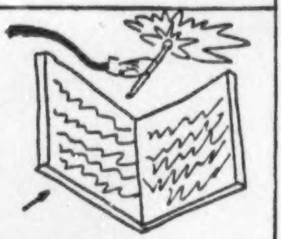
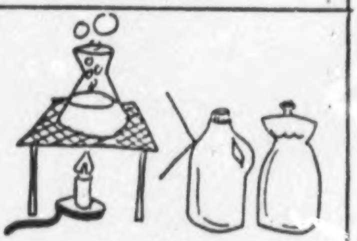
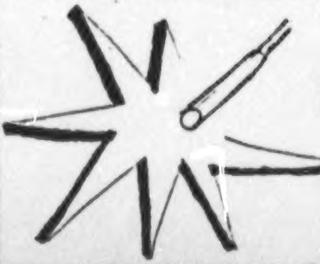
_____ Another name for a ruler,

_____ A tool used to set the degree of an angle,

ARC WELDING I
Checkup 1
Lesson 1

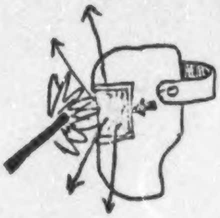
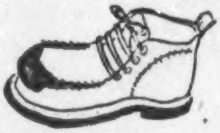
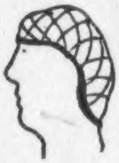
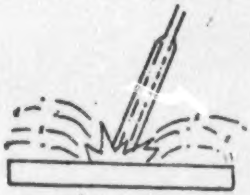
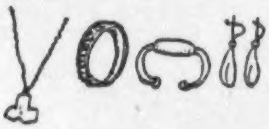
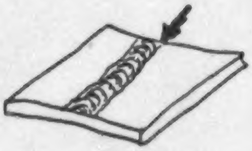
Name______________________________ Date___________________________

Put the number of the picture next to the word AND next to the meaning. The first one is done for you.

WORD	PICTURE	MEANING
_____ combustible	 1	_____ This means that clothes will not burn if touched by fire.
_____ synthetic	 2	_____ When clothes or other materials burn.
_____ non-combustible	3 	_____ Threads at the edge of cloth that are loose.
_____ heat resistant	4 	_____ Clothes or other things that can take some heat without burning.
_____ frayed	 5	_____ Things that are man-made
_____ glare	 6	_____ A very bright light.

Checkup 1 (page 2)

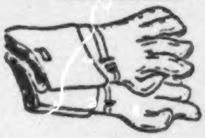
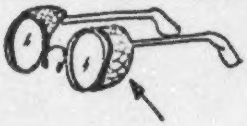
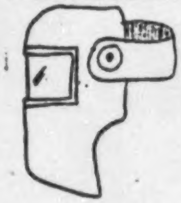
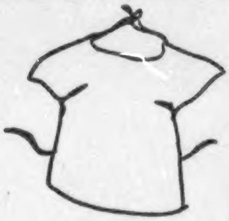
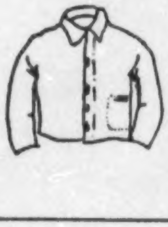
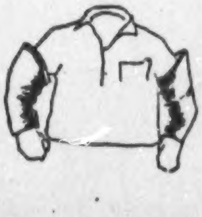
Name______________________________ Date__________________________

WORD	PICTURE	MEANING
_____ steel toe shoe	 7	_____ This holds your hair in place.
_____ sparks and spatter	 8	_____ A shoe that protects your foot from heavy falling objects.
_____ hair net	 9	_____ Small burning pieces of metal.
_____ coating		_____ A safety colored glass that protects the face from harmful glare.
_____ filter lens	10	_____ A thin sheet that spread over the metal during welding and protects the weld.
_____ jewelry	 11	_____ Chains and rings not to be worn around machines.
	 12	

ARC WELDING I
Checkup 2
Lesson 2

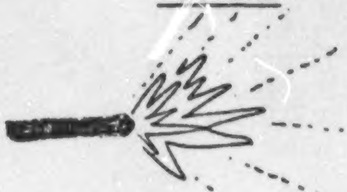
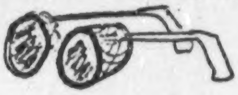
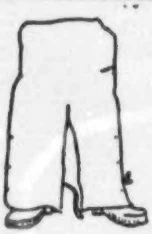
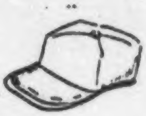
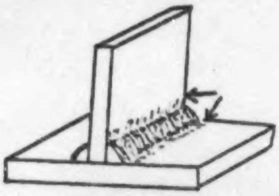
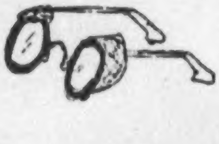
Name________________________ Date____________________

Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
_____ helmet	 1	_____ A jacket that protects your chest and arms from sparks, spatter, and radiation.
_____ leather bib	 2	_____ Protects your arms from sparks and spatter.
_____ side shield	 3	_____ A hood with safety glas and colored lens used to protect your head.
_____ leather jacket	 4	_____ These protect your hand from sparks and spatter.
_____ leather sleeves	 5	_____ Protects your chest from sparks and spatter.
_____ leather gloves	 6	_____ A guard on the side of goggles that protects the eyes.

Checkup 2 (Page 2)

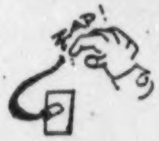
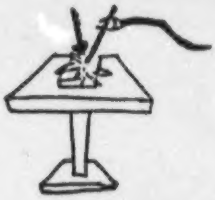
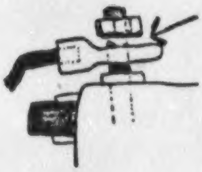
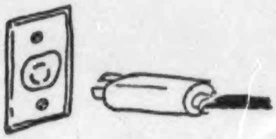
Name______________________________ Date__________________________

WORD	PICTURE	MEANING
_____ slag	 7	_____ Large, green-tinted eyeglasses that protect your eyes.
_____ welder's cap	 8	_____ A covering used to protect your legs.
_____ safety goggles	 9	_____ Hot waste metal and coating.
_____ radiation	 10	_____ Large, clear eyeglasses that protect your eyes.
_____ flash goggles	 11	_____ Protects your hair and ears from sparks and spatter.
_____ leather leggings	 12	_____ Bright light and heat given off when welding.

ARC WELDING I
Checkup 3
Lesson 3

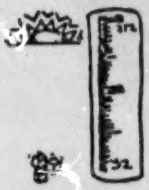
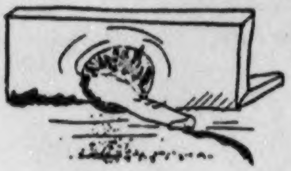
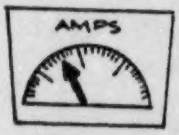
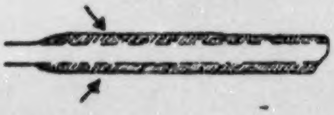
Name__________________________ Date_________________________

Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
_____ loose connection	 1	_____ To stop the electricity
_____ disconnect	 2	_____ The flow of electricity through the air between two points.
_____ arc	 3	_____ A jolt of electricity to the body.
_____ electric shock	 4	_____ A cable connection that is not firmly fastened t the power terminal.

Checkup 3 (page 2)

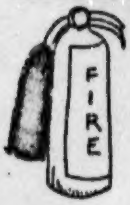
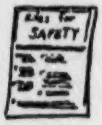
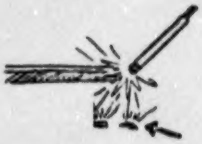
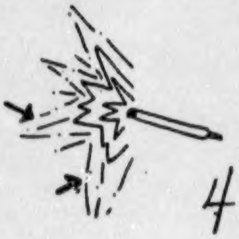
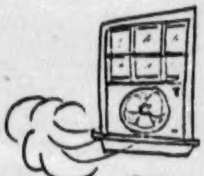
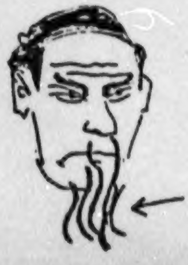
Name______________________________ Date__________________________

WORD	PICTURE	MEANING
_____ amperage	 5	_____ To wear away by grindin and scraping.
_____ insulation	 6	_____ Material that does not carry electricity, used to prevent short circui and shocks.
_____ Fahrenheit	 7	_____ A way to measure how hot or cold something i
_____ abrasion	 8	_____ The amount of electrici that is sent through an arc welding cable.

ARC WELDING I
Checkup 4
Lesson 4

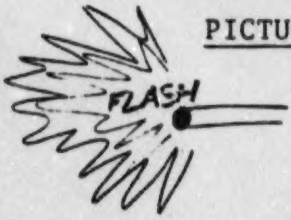
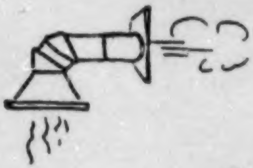
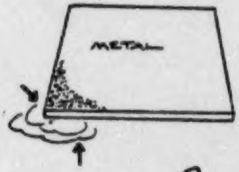
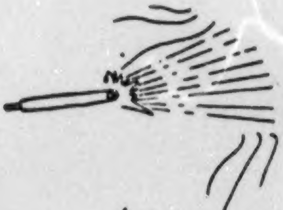
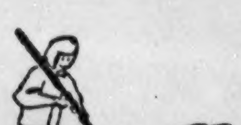
Name______________________________ Date________________________

Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
_____ toxic fumes	 1	_____ Rules to follow to keep from getting hurt.
_____ fire extinguisher	2 	_____ Heat caused by heat ray that you cannot see.
_____ infrared	3 	_____ Gases or smells that are poison.
_____ ventilation	 4	_____ Metal that becomes liquid when it is very, very hot.
_____ safety procedures	 5	_____ A tank that holds a special liquid to put out fires.
_____ molten metal	 6	_____ To bring in good air and take out bad air.

Checkup 4 (page 2)

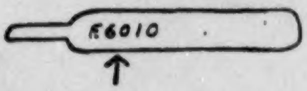
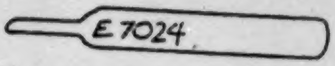
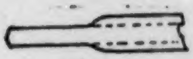
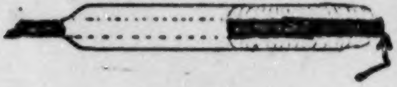
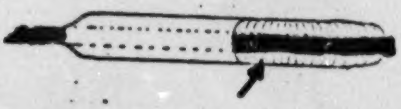
Name____________________ Date____________________

WORD	PICTURE	MEANING
_____ housekeeping	 7	_____ A sudden burst of light or heat.
_____ duct	 8	_____ Keeping the work area clean.
_____ ray	 9	_____ Wetness caused by water or other liquid.
_____ flash		_____ A tube which removes fumes or liquids from the work area.
_____ moisture	 10	_____ A thin line of light or heat that you cannot see.
	 11	

ARC WELDING II
Checkup 5
Lesson 5

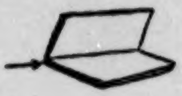
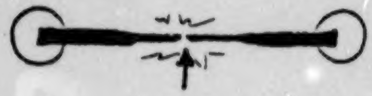
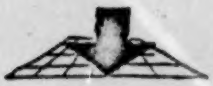
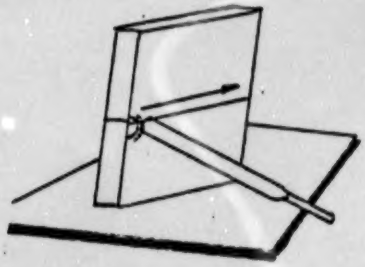
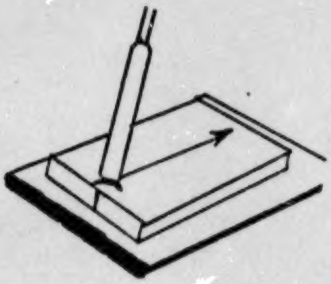
Name ______________________________ Date __________________________

Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
_____ electrode	 1	_____ The outside of an electrode.
_____ filler metal	 2	_____ A piece of an electrode left over after arc welding.
_____ flux coating	 3	_____ A melted stick or rod used to join pieces of metal.
_____ E-stub	 4	_____ The inside of an electrode.
_____ electrode code	 5	_____ A set of numbers that tell you the way to arc weld.

Checkup 5 (page 2)

Name______________________ Date______________________

WORD	PICTURE	MEANING
_____ tensile strength	 6	_____ The number of pounds of pressure placed on each square inch of metal.
_____ position	 7	_____ When the metal to be welded lies flat on the table.
_____ P.S.I.	 8	_____ The amount of pressure a weld can take before it breaks.
_____ flat position	 9	_____ The position when the weld goes straight across from one side to the other.
_____ horizontal position		_____ The way two pieces of metal are welded togethe
	 10	

Checkup 5 (page 3)

Name______________________ Date_______________________

WORD

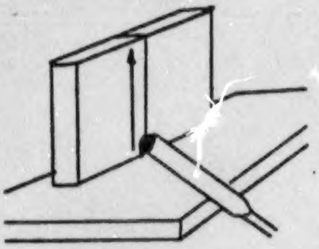
_____ overhead position

_____ welding position

_____ vertical position

_____ current

PICTURE



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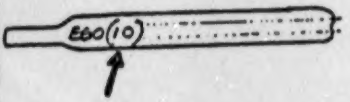
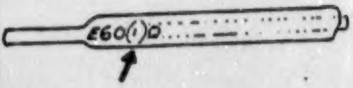
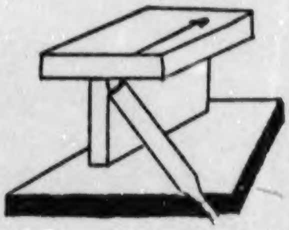


12



13



14

MEANING

_____ The position when you weld the metal nearest the table first and then weld up the joint.

_____ The amount of electrici that flows through a wire.

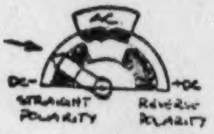
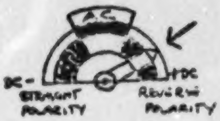
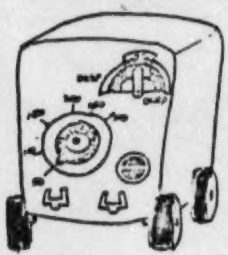
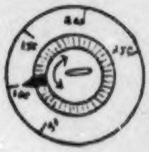
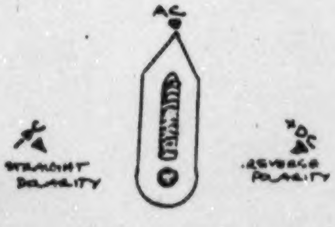
_____ The welding is done from the underside of the joint.

_____ This is either flat, horizontal, overhead, or vertical.

ARC WELDING II
Checkup 6
Lesson 6

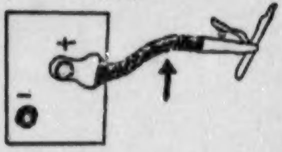
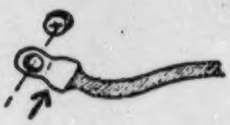
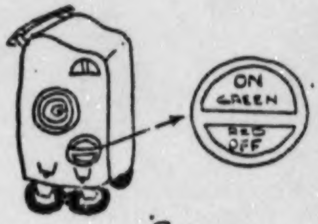
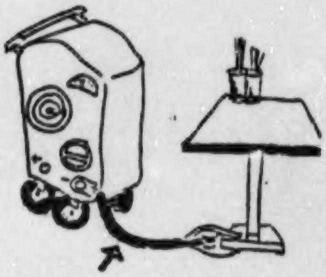
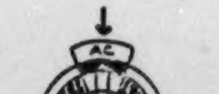
Name______________________________ Date_________________________

Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
_____ arc welding machine	 A.C. DC- STRAIGHT POLARITY +DC REVERSE POLARITY 1	_____ A control that tells how much electric curre is coming through the machine.
_____ polarity switch	 A.C. DC- STRAIGHT POLARITY +DC REVERSE POLARITY 2	_____ A machine that uses electricity to join pieces of metal togethe
_____ current control	 3	_____ The kind of electric current that is most often used in arc weldi The electrode is hotter than the work piece.
_____ DC straight polarity	 4	_____ The switch on the arc welding machine you turn to point to the kind of current you nee for the welding job.
_____ DC reverse polarity	 A.C. STRAIGHT POLARITY +DC REVERSE POLARITY 5	_____ A kind of electric current used. The work piece is hotter than the electrode.

Checkup 6 (page 2)

Name____________________ Date____________________

WORD	PICTURE	MEANING
_____ A.C.	 6	_____ The switch that starts and stops the arc welding machine.
_____ on-off switch	 7	_____ The wire that goes from the arc welding machine to the electrod holder.
_____ electrode cable	 ON GREEN RED OFF 8	_____ A kind of current that spreads the heat evenly between the work piece and the electrode.
_____ ground cable		_____ A round copper washer that fits onto the end of the electrode cable.
_____ electrode cable connector	 9	_____ A wire that must be connected to both the arc welding machine and the work table.
	 AC DC− STRAIGHT POLARITY +DC REVERSE POLARITY 10	

Checkup 6 (page 3)

Name________________________ Date__________________

WORD

_____ ground clamp

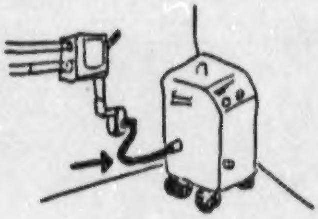
_____ power cable

_____ welding table

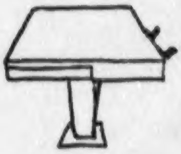
_____ E-holder

_____ ground cable connector

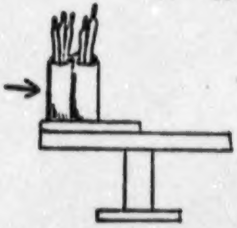
PICTURE



11



12



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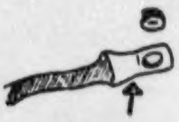
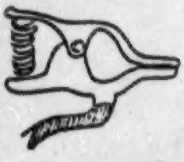


14



15

MEANING

_____ A stand used to place the electrode on.

_____ A steel table used in welding.

_____ A tool that connects the ground cable to the metal being welded.

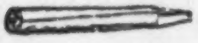
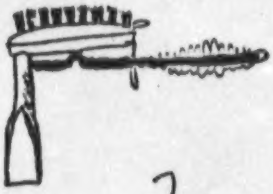
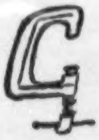
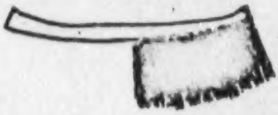
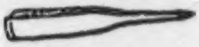
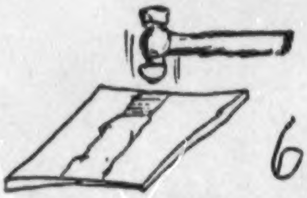
_____ An insulated cord that brings power from the switch box to the welding machine.

_____ A round, copper washer which fits onto the end of the ground cable.

ARC WELDING II
Checkup 7
Lesson 7

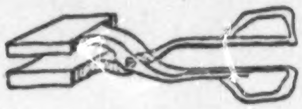
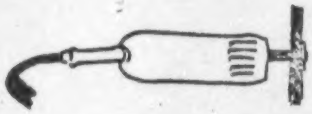
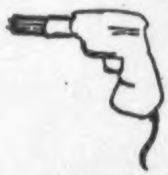
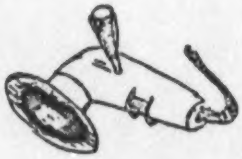
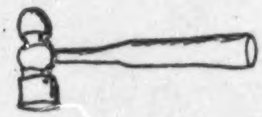
Name______________________________ Date______________________________

Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
_____ hand chipping hammer	 1	_____ A flat steel cutting tool with a sharp edge and a handle.
_____ cleaning brush	 2	_____ A tool used to remove slag from a finished weld.
_____ chisel	 3	_____ A wire brush used to clean slag from a finished weld.
_____ C-clamp	 4	_____ A small tool with a round edge used for making punch marks for drilling.
_____ pein	 5	_____ A device used to hold metal firmly for welding.
_____ center punch	 6	_____ To remove bumps on a finished weld by hammering.

Checkup 7 (page 2)

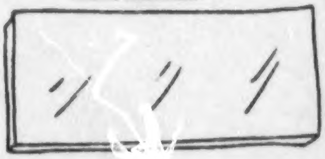
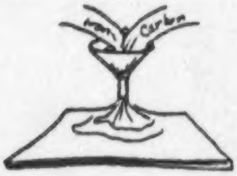
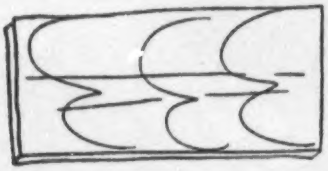
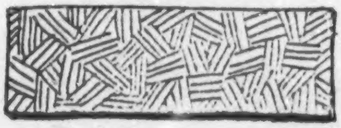
Name_____________________ Date ________________

WORD	PICTURE	MEANING
_____ ballpein hammer	 7	_____ A hand-held tool used to grind welds to a flat finish.
_____ disc grinder	 8	_____ A hammer used to pein welds.
_____ power cleaning brush	 9	_____ A brush turned by a motor to remove rust from a weld.
_____ air chipping hammer	 10	_____ A tool used to pick up hot welded metal pieces.
_____ tongs		_____ A power tool used to remove slag from a finished weld.
	 11	

ARC WELDING II
Checkup 8
Lesson 8

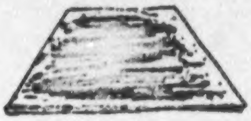
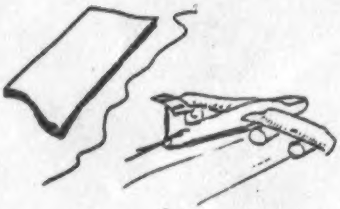
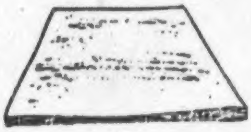
Name______________________________ Date______________________________

Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
_____ alloyed steel	 1	_____ Steel covered with zinc.
_____ cold roll steel	 2	_____ Steel with a thin, blue finish that is rolled while it is hot.
_____ galvanized steel	 3	_____ Steel made from mixing iron with carbon.
_____ hot roll steel	 4	_____ Steel with a clean finish rolled while it is cold.

Checkup 8 (page 2)

Name__________________________ Date______________________

WORD	PICTURE	MEANING
_____ aluminum	 5	_____ Steel that has only a little carbon in
_____ high carbon steel	 6	_____ A very light-weight metal.
_____ low carbon steel	 7	_____ Steel that has a lot of carbon in it

ARC WELDING III
Checkup 9
Lesson 9

Name_______________________ Date_______________________

Put the number of the picture next to the word AND next to the meaning.

WORD

_____ groove

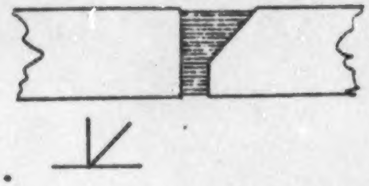
_____ square groove

_____ groove weld

_____ bevel groove

_____ V groove

PICTURE



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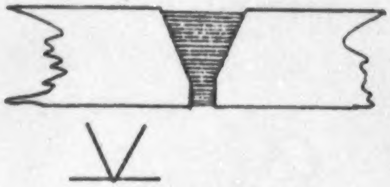

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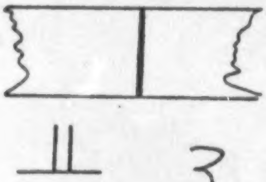
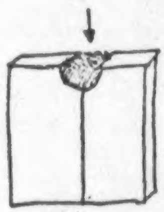
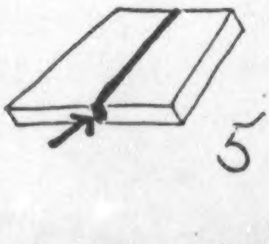


3



4



5

MEANING

_____ A way to join thick pieces of metal. The cut is made in only one of the pieces.

_____ A cut in the metal.

_____ A cut used to join pieces of thin metal.

_____ This cut looks like the letter V.

_____ A weld made in a space between two pieces of metal.

Checkup 9 (page 2)

Name____________________________ Date__________________________

WORD

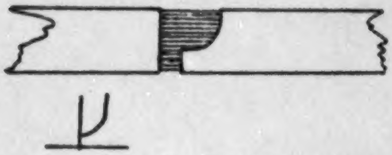
_____ U groove

_____ flare v groove

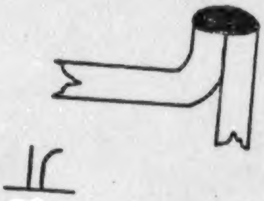
_____ J groove

_____ flare bevel groove

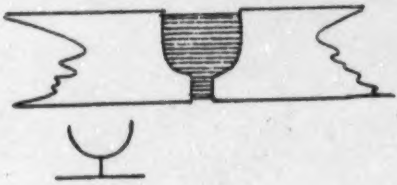
PICTURE



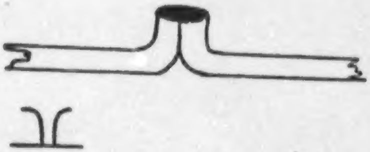
6



7



8



9

MEANING

_____ A cut joining pieces of thick metal that looks like the letter

_____ A way to join thin pieces of metal. Only one of the pieces to b welded is bent.

_____ A way to join thin pieces of metal when both of the pieces are bent.

_____ A cut joining pieces of thick metal that looks like the letter U

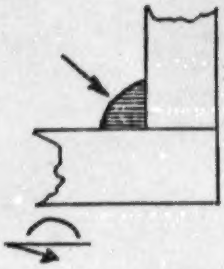
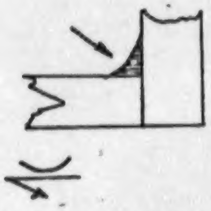
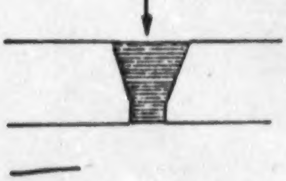
ARC WELDING III

Checkup 10

Lesson 10

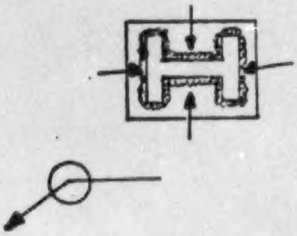
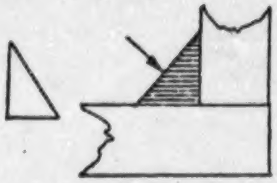
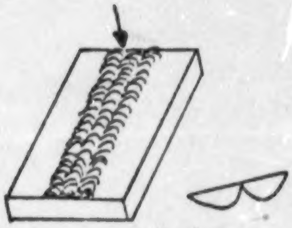
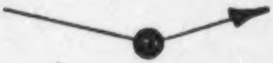
Name________________________ Date__________________________

Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
_____ flush contour weld	 1	_____ A weld that sinks in the middle.
_____ concave weld		_____ A weld that rises in the middle.
_____ convex weld	 2	_____ A weld that is flat.
	 3	

Checkup 10 (page 2)

Name____________________________ Date____________________

WORD	PICTURE	MEANING
_____ field weld	 4	_____ A weld used to build up worn out parts.
_____ fillet weld	 5	_____ A weld that is made someplace else than in the shop.
_____ weld all around		_____ A weld that makes a square corner.
_____ surface weld	 6	_____ To join metal by welding all around the outside of the pieces.
	 7	

ARC WELDING III
Checkup 11
Lesson 11

Name______________________________ Date__________________________

Put the number of the picture next to the word AND next to the meaning.

WORD

_____ butt joint

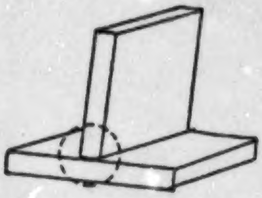
_____ corner joint

_____ tee joint

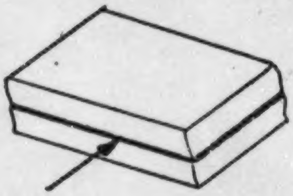
_____ edge joint

_____ lap joint

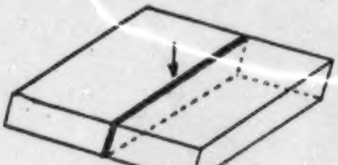
PICTURE



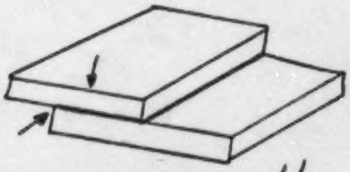
1



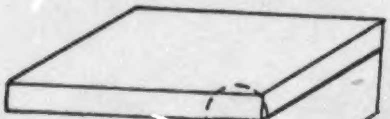
2



3



4



5

MEANING

_____ A joint in the shape of the letter T.

_____ A joint used with pieces of metal that lie side by side.

_____ A joint in the shape of the letter L.

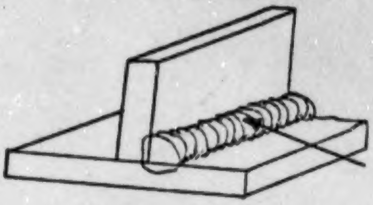
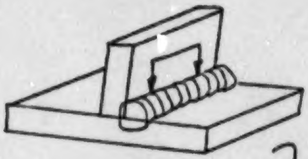
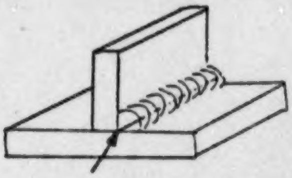
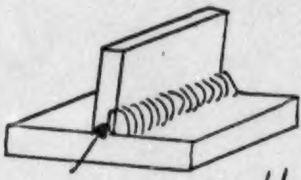
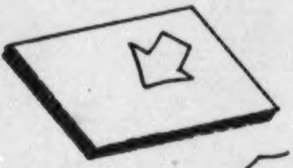
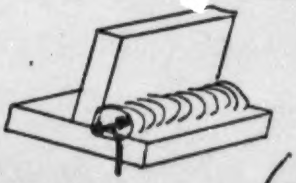
_____ A joint used when one piece of metal hangs over the other.

_____ A joint used with pieces of metal that stand side by side.

ARC WELDING III
Checkup 12
Lesson 12

Name________________________ Date____________________

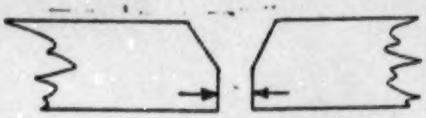
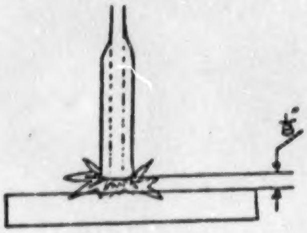
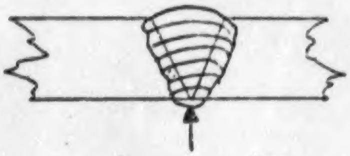
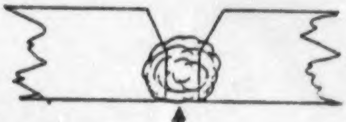
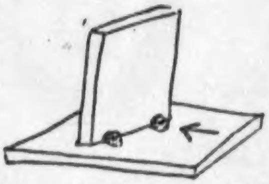
Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
_____ base metal	 1	_____ The raised part of the weld you can see from the side where the welding was done.
_____ root	 2	_____ Metal that is made of iron that is to be welded.
_____ face	 3	_____ The place where the pieces of metal that are to be welded meet each other.
_____ toe	 4	_____ The amount of space measured from the root to the toe.
_____ leg	 5	_____ The amount of space from the root to the face.
_____ throat	 6	_____ Where the raised part of the weld meets the base metal.

ARC WELDING III
Checkup 13
Lesson 13

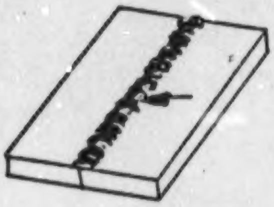
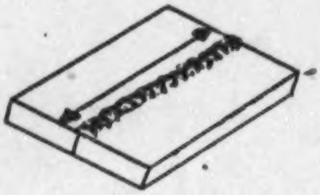
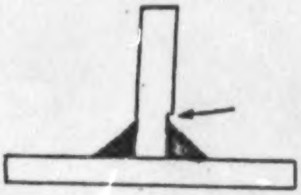
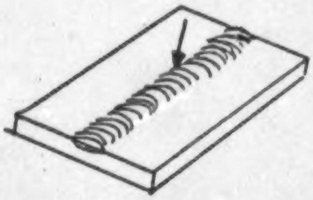
Name__________________________ Date________________________

Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
_____ arc length	 1	_____ A small weld that holds parts of metal in place during welding.
_____ melt through weld	 2	_____ The amount of space between two pieces of metal to be welded.
_____ root penetration	 3	_____ The amount of space from the end of the electrode to the place where the arc touches the metal.
_____ tack weld	 4	_____When the weld metal has gone all the way into the opening and can be seen on the other side.
_____ root opening	 5	_____ How deep the weld goes into the two pieces of metal.

Checkup 13 (page 2)

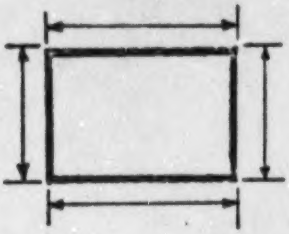
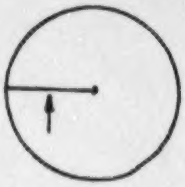
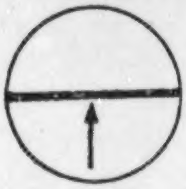
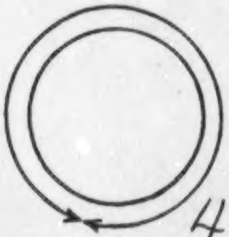
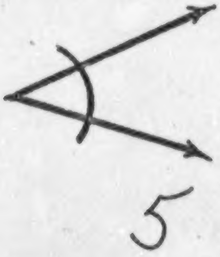
Name________________________ Date________________________

WORD	PICTURE	MEANING
____ bead	 6	____ The space near the toe of a weld that is not filled by weld metal.
____ stringer bead	 7	____ A long string of weld metal that goes from one end of a joint to the other.
____ continuous weld ____ undercut	 8	____ Another name for weld metal. ____ A line of drops of weld metal.
	 9	

ARC WELDING III
Checkup 14
Lesson 14

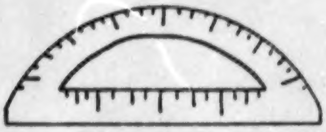
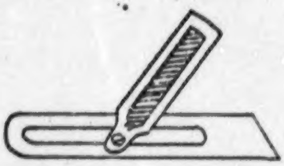
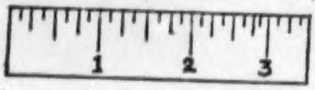
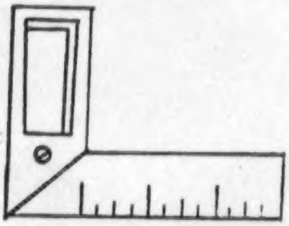
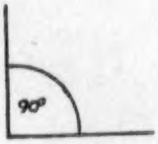
Name__________________________ Date__________________________

Put the number of the picture next to the word AND next to the meaning.

WORD	PICTURE	MEANING
_____ angle	 1	_____ The length around the outside of a figure.
_____ circumference	 2	_____ The figure made when tw lines meet.
_____ radius	 3	_____ The length across the middle of a circle.
_____ distance	 4	_____ The distance around the outside of a circle.
_____ diameter	 5	_____ The distance from the middle of a circle to the edge.

Checkup 14 (page 2)

Name______________________________ Date______________________________

WORD	PICTURE	MEANING
_____ straight edge	 6	_____ A tool used to check right angles.
_____ degree	 7	_____ A type of ruler for measuring angles.
_____ T-bevel	 8	_____ The name for the size of an angle.
_____ protractor	 9	_____ Another name for a ruler.
_____ square	 10	_____ A tool used to set the degree of an angle.